TANGANYIKA TERRITORY

DEPARTMENT OF AGRICULTURE

ANNUAL REPORT

1945

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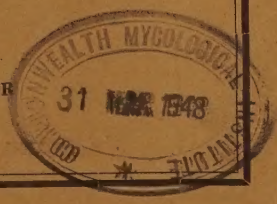

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SECTION I.—INTRODUCTION

During the years of the war for security reasons and economy in stationery the Annual Reports of the Department of Agriculture were reduced to the most condensed form of summary into which information on the work of the Department could be compressed. The Report for 1945 resumes the pre-war practice of publishing full reports on the activities of the Department.

GENERAL REVIEW OF THE YEAR

Climatic conditions for agriculture differed greatly and this is to be expected in a country so large as Tanganyika Territory. Generally, the season was unfavourable for crop production with a few notable exceptions—the adverse results however were not due to the same causes in the different provinces. In the Central Province sufficient rain fell to mature rather light crops of food below normal expectations, but sufficient for local requirements, while in the Northern Province conditions, though difficult and patchy in parts, resulted in good harvests of all the staple grains although the coffee crop was shorter. The Eastern, Southern, Tanga and Western Provinces all suffered from abnormally heavy rain at the beginning of the main rainy season causing much flood damage and delay in planting and subsequent difficulties in weeding. Later the rain tended to tail off at the time when more was needed to set seed, resulting in short food crops and a below-normal cotton crop in those areas that produce cotton. The Lake Province, except for Bukoba which had a normal season, suffered rather more than the rest of the Territory from adverse weather, for after promising short rains, drought set in, and when eventually the main rains became general they were in time to give only a fair cotton crop but were too late to save either the rice or the groundnut crop, though a modest grain crop was reaped in most parts. The south-western areas of the Southern Highlands also suffered from damaging floods but the northern and southern sections harvested normal food crops though excessive rain had adverse effects on tobacco.

Price and produce control with guaranteed prices continued to be enforced by law as in the war years and all prices of commodities were maintained at economic levels. The figures for total exports of agricultural commodities by years shown below are indicative of the trend of production, but they are not a wholly true reflection of actual production for export for the war years

1940 to 1945 because during that period many thousands of troops in transit as well as foreign internees and war refugees were fed largely on local produce that might otherwise have been exported. Exports by years were :—

	Tons		Tons
1938	158,078	1942	226,071
1939	174,121	1943	144,808
1940	162,595	1944	168,372
1941	168,446	1945	165,002

NON-NATIVE PRODUCTION

The District Production Committees in Arusha, Iringa, Moshi, Kilosa and Morogoro have continued to function. The Korogwe Committee was disbanded at the end of 1945. The value of the Committees cannot be over-emphasized. They have rendered invaluable advice and their responsibilities, extended by the Increased Production of Crops Ordinance enacted in 1944, have greatly increased.

The following table shows the acreages of crops dealt with by the various Production Committees and illustrates the valuable work they are performing :—

Production Committee and Acreage

Crop	Moshi	Iringa	Morogoro	Kilosa	Arusha	Total
Maize	6,677	2,505	997	5,930	4,406	20,515
Wheat	1,707	711	—	—	6,330	8,748
Coffee	3,094	—	—	185	6,101	9,380
Beans	509	696	142	470	1,155	2,972
Cotton	—	—	—	1,075	—	1,075
Pawpaw	773	—	—	—	—	773
Tobacco	—	830	—	—	—	830
Cowpeas	—	—	—	395	—	395
Pulses	—	—	—	46	—	46
Seed Beans ...	—	—	—	—	1,556	1,556
Potatoes Vegetables ...	77	109	—	—	—	186
Other crops ...	3,586	50	590	478	9,476	14,180
	16,423	4,901	1,729	8,579	29,024	60,656

Estate agriculture generally has increased during the years of war and this trend continued in the year under review. Sisal, coffee, tea and other crops on non-native estates were more than maintained. The war has brought with it control of most commodities produced by estates and with this control there has come inevitably, a stronger sense of co-operation of farmers with Government and among themselves. Many of the associations, boards and bulk marketing organizations existed before the war it is true, but it may be said that these all now work in greater harmony and at a higher pitch of efficiency than ever before. Sisal production again increased and coffee production, while slightly lower than last year, was maintained at a high level, and, though not up to the 1943 export figure, the present figure is nevertheless satisfactory. Sugar shows a big drop in exports but both the low sugar and medium tea figures are explained by increased local consumption. Exports of pyrethrum have almost doubled while wheat has more than doubled. Seed bean production has made steady progress.

NATIVE AGRICULTURE

Native agriculture production may be viewed in three parts, namely the growing of food by the native to supply his own and his family's needs, the production of inedible purely cash crops for sale such as cotton and coffee, and thirdly the production and sale of surplus food after the natives' own need has been met.

Dealing with the cash crops first, the cotton crop was a fair one, for although the Mwanza harvest was the greatest since 1936 from an increased acreage, and Shinyanga gave a good average, the Musoma crop was poor while that of the Central Line was less than in 1944 and was only half of that yielded in 1943. The coffee crop in Bukoba showed an increase in spite of some cherry fall. The Northern Province native coffee crop fell below expectations though its average over the previous seven years was maintained. The crops in the smaller coffee areas were all well up to expectation. The Southern Province sesame crop was far below those of the record production years, but an average was maintained. Beeswax reached a new record export figure but gums fell below the average. The Songea tobacco crop was a poor one producing the lowest total for many years.

Native domestic food crops were on the whole satisfactory, the only food shortages being of a minor nature and purely local. The grain reserves in the Central Province were well maintained but crops in Shinyanga were such that its reserves are now almost negligible.

Native surplus food for sale was not generally in abundance. The Lake Province rice crop suffered severely from drought and the Eastern Province and the Rungwe crops from floods. Native grains dropped and groundnuts were almost negligible in all but the Southern Province, where though groundnut production was maintained, other food surpluses were very far below normal. In the Southern Highlands, Kilosa and the Northern Province fair levels were maintained.

During the war years native food production, as well as that of many of the native cash crops, has been of major importance, so much so that apart from actual recruiting for the military services and sisal production, it has had to be pushed to the exclusion of all else. The price of this assistance in winning the war has to be paid in this Territory. The extension of food crops has often been carried out at the expense of expanding our former teachings of systems of permanent agriculture, and shortage of staff has reduced experimental work to a bare maintenance basis. Now with a world food crisis threatening, food production remains of paramount importance. The need, however, to consolidate the gains in native agriculture by maintaining production without an ever increasing acreage, remains with us, and plans for resuming and increasing experimental work and re-commencing agricultural improvement generally are in train.

LABOUR

Labour supplies, and more particularly the food supplies for labourers, have been a decided limiting factor in non-native production for the reason that so much food had to go to the Territory's extra war time population. Thus the restriction by law of acreages of new plantings of such plantation crops as sisal, tea, pyrethrum, tobacco and pawpaw, to conform strictly to make the best use of available labour, was continued in 1945. With

demobilization of military services going on apace, it is not unreasonable to suppose that the actual supply of labour may improve, but with a world food shortage existing it is not practicable to remove the limitation of acreages of certain crops for the present.

The conditions for employment of labour continue to improve steadily. Housing, rationing and conditions of work have continued to benefit greatly from the increasing help from the Labour Department to Estate owners and labourers alike.

SOIL CONSERVATION

Soil conservation programmes have suffered somewhat throughout the Territory because of the priority production of food in the years of the war. Nevertheless in many areas regular gangs of soil conservation instructors are employed throughout the year on this work. During the year under review in the Uluguru and Nguru mountains of the Eastern Province further demonstrations were laid out. In the Western Usambaras many hundreds of miles of contour hedges were planted and contour guide lines pegged on native holdings, while in the Northern Province all former works were maintained and extended. In the Central Province it may be said that all problems begin and end with soil conservation and there also some progress has been maintained.

Non-native estates have also tended to make progress in soil conservation work, particularly in the Northern Province. Excellent demonstration of erosion control has been given on the Northern Province Wheat Scheme, where all the work was carried out by mechanical means.

MARKETING

The war-time control of marketing of most agricultural produce continued under the system of guaranteed prices. In the Southern Province native authority markets were inaugurated early in the year for the first time in that area so that some form or organized produce marketing is now in use in all provinces of the Territory. The two large native co-operative marketing unions, namely the Kilimanjaro Native Co-operative Union Limited which deals with native coffee, and the Ngoni Matengo Co-operative Marketing Union Limited which grades and bales native tobacco, both continued to function under prudent policies. The marketing of the Muhesa orange crop, the Bukoba coffee, vegetables and other products continued to be dealt with smoothly by their various organizations.

LOCUSTS

Hoppers of the *Desert Locust*, which had hatched from eggs laid around Kilimanjaro, were successfully dealt with early in 1945. Later, immature swarms arrived from Kenya in the Northern and Tanga Provinces, afterwards reaching the Central Province. By April all swarms had moved to the Lake Province and some returned to Kenya through Musoma. From May until November there were no reports of Desert Locusts in the Territory but the influx from Kenya then started again. Two swarms in Tanga were followed by others in Moshi and egg laying occurred during December in a number of localities north of the Tanga-Moshi railway. A hopper campaign was in operation at the close of the year. Little damage is recorded from Desert Locusts at the close of the year.

In regard to *Red Locusts*, assistance was given to the International Red Locust Control in dealing with hoppers over a wide area in south-western Tanganyika around Lake Rukwa. In July the number of swarms in the Rukwa area was somewhat alarming and further help had to be given to the International Red Locust Control in a hopper campaign in December, after egg laying commenced in November. Little crop damage is recorded from Red Locusts during the year, and reports recently received indicate that the campaign has been most successful.

PESTS AND DISEASES

Central Line cotton suffered considerable damage from *Dysdercus* consequent on late planting. *Helopeltis bergrothi Reut.* did considerable damage but only in restricted areas. Pink bollworm appeared earlier and in greater numbers than it has done for some years. The cotton pest situation in the Lake Province was an improvement on recent years though stainers and American bollworm were prevalent in restricted areas. In Handeni leaf roller, *Sylepta derogata F.*, was widespread.

Antestia, thrips and stem borer were active in coffee in the Northern Province and a severe infestation of antestia coffee in Mbosi. Increased activities of borer were reported from all coffee areas.

Damage to pyrethrum by thrips is recorded and onions in the Northern Province had infestations of thrips. Pests of beans did severe damage in the Western Province. Widespread damage to sorghums from stalk borer, *Busseola fusca Fuller*, was reported in the Western and Lake Provinces and it was particularly severe in the Central Province.

An epidemic of the grey field mouse, or *multi mammate* rat, occurred in the Eastern, Southern and Tanga Provinces and it damaged grain and cotton also fairly extensively.

The important plant diseases observed during the year were the suspected virus diseases of sweet potato, and Bacterial wilt (*Xanthomonas Solanacearum*) of the English potato. The former was found to have a wide distribution along the north of the Central Railway and to infest all varieties observed though damage was not great. Observation plots for this disease have been established at Ukiriguru, Morogoro and Lyamungu. Bacterial wilt was found in English potatoes near Lushoto. The same disease was found in tomato plants at Lyamungu. *Phytophthora infestans*, late blight in potatoes, was again widespread in the Ulugurus, Mporotos and the Usambara mountain areas.

EXPORT CROP FIGURES

The following table shows the principal exports of the territory since 1938 with the value of those for 1945

	Maximum output for export prior to 1945		1938	1939	1940	1941	1942	1943	1944	1945		
			Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Total Value	Value per ton f.o.b.
	Year	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	£	£
Sisal	1942	136,237	101,400	93,110	78,528	75,195	136,237	96,598	111,848	110,637	3,068,744	27—14¾
Sisal (Manufactured) ...	1936	2,325	8	—	5	15	26	30	8	—	—	—
Cotton Lint	1941	13,106	8,871	11,633	10,624	13,106	8,009	7,002	5,944	7,192	752,111	104—11½
Coffee	1935	18,588	13,730	16,599	15,634	13,667	14,828	10,898	15,561	14,441	896,301	62— 1½
Groundnuts	1936	22,786	3,579	4,496	8,185	11,312	13,193	1,752	627	955	15,114	15—16½
Hides and Skins ...	1939	4,286	3,720	4,286	3,946	3,512	2,993	2,339	2,871	*2,259	170,294	75— 7¾
Copra	1928	9,318	4,004	6,378	3,095	3,620	3,700	2,816	1,368	5	90	18— 0
Sesame	1938	5,241	5,241	4,639	2,052	3,018	3,563	3,180	1,712	1,441	20,168	14— 0
Rice	1941	17,965	8,196	9,901	15,204	17,965	17,948	4,673	4,494	2,171	37,679	17— 7
Millet and Mtama ...	1928	7,732	1,817	7,181	4,514	3,280	3,348	913	1,501	3,804	39,370	10— 7
Maize	1934	2,901	279	1,751	2,831	940	713	9	—	20	240	12— 0
Beeswax	1937	738	686	456	468	712	348	586	627	†795	132,297	166— 8½
Tea	1943	503	141	195	316	340	483	503	328	400	51,031	127—11½
Sugar	1941	5,454	4,032	3,664	4,876	5,454	4,380	1,813	4,293	1,130	19,996	17—14
Gums (Copal and Arabic)	1944	2,567	1,274	1,311	965	1,405	904	390	2,567	1,712	107,274	62—13¼
Ghee	1942	1,385	847	896	1,213	1,125	1,385	750	400	249	24,981	100— 6½
Wheat	1941	2,475	—	1,426	1,450	2,475	2,166	1,887	1,960	†4,511	73,963	16— 8
Tobacco	1944	1,122	244	441	506	649	820	1,052	1,122	935	88,836	95— 0¼
Rubber	1944	1,314	—	—	13	7	213	451	1,314	2,320	303,851	130—19¼
Vegetable oils (Coconut and Groundnut) ...	1940	2,268	—	1,061	2,268	1,718	1,720	1,056	983	1,801	74,850	41— 1
Papain	1944	64	7	4	18	15	21	39	64	101	113,598	124—14½
Onions	1944	2,007	—	1,058	989	1,265	1,204	1,896	2,007	1,849	38,315	20—14¼
Pyrethrum	1944	396	2	100	244	229	305	306	396	697	93,560	134— 4¾
Fats, including Substitute for Ghee and butter	1944	1,247	—	—	—	1,039	273	664	1,247	650	38,808	59—14
Mangrove Bark ...	1942	7,291	—	—	4,655	6,383	7,291	3,205	5,100	4,927	53,588	10—17½
		269,316	158,078	174,121	162,595	168,446	226,071	144,808	168,342	165,002	6,215,059	37—13¼

*Includes 1,800 tons hides and 34,434 skins weighing at approximately 1,500 per ton. †New highest export tonnage.

NOTES ON THE CHIEF EXPORT CROPS

Sisal

This industry is responsible for more than half the export tonnage of the Territory. In 1940 it was in a difficult condition suffering as it was from the loss of its continental market owing to the war with Germany. At the end of 1940 production was reduced by 25 per cent by arrangement with His Majesty's Government. The fall of Manila and Java, following Japan's entry into the war with the consequent loss of the fibre produced in those countries, made Tanganyika sisal of vital necessity for the prosecution of the war and since that time the industry has expanded until the production has reached new high records.

The following figures show the rise of the industry since 1941. The figures are for actual production by years :—

	Tons
1941	51,640
1942	99,024
1943	102,369
1944	111,313
1945	112,218

The production is in three areas, namely the Lindi-Mikindani area of the Southern Province, the Central Line areas and the Tanga Line area. These produce on an average approximately :—Tanga Line 59 per cent, Central Line 29 per cent and Southern Province 12 per cent. In 1945 production and exports were :—

	Production tons		Shipments tons
Southern Province	11,912	...	10,503
Central Line	35,497	...	33,650
Tanga—Northern Province ...	64,809	...	66,120
	112,218	...	110,273

The 1945 value of exports reached £3,212,917.

With regard to the agriculture of sisal, the crop is also facing the price that must be paid for war. Since 1942 its production has been of the highest priority and every ton of sisal produced has been a direct contribution to the war effort. The consequence is that production has often been carried on at the expense of replanting, and, while there are probably estates that possess a high degree of fertility upon which the intense war production has made but little inroads, there are many more that are not in that fortunate position. The industry as a whole is fully alive to this problem of the maintenance of soil fertility and the Sisal Experimental Station at Ngomeni, as well as some estates, are studying, amongst other things, fallow periods between sisal cycles. The problem of erosion is also one for study, while the interplanting of green manures and cover crops, mechanical cultivation and other important matters, are receiving attention. The immediate future of the industry is now assured but the cost of production of fibre must be lowered and a wider range of uses explored.

In 1945 all sisal production continued to be shipped under contract to the Ministry of Supply. The contract terminates two years after the cessation of hostilities with Japan, with the option of the Ministry to terminate it two years after cessation of hostilities with Germany.

Coffee

(a) *Native Coffee.*—The progress recorded last year in the field treatment of coffee in Bukoba has continued. A special native staff was maintained

again with success to supervise mulching, and pruning also continued to improve. Unfortunately considerable cherry fall occurred but in spite of this the high average export of 8,074 tons was maintained. Last year the export was 9,609 tons, nevertheless the 1945 figure represents a large increase on that for 1943. The small Ngara native crop exceeded expectations with a crop of 139 tons.

Both Robusta and Arabica coffees are grown in Bukoba and the latter is classed with the Robusta as Hard Coffee commercially on account of its method of preparation. All the coffee is graded and inspected prior to its export. Marketing is through the Hard Coffee Control which functioned with its usual efficiency throughout the year.

The Kilimanjaro Native Mild Coffee crop fell short of the 1941 record by only 100 tons, the total for the 1944/45 crop being 3,962 tons of parchment coffee. The 1945/46 crop now being harvested should reach 3,100 tons. As a result of proposals by the Moshi Native Coffee Board a graduated levy on the native crop has been approved which will finance widespread improvements in cultivation practice based on the findings of experiments at the Coffee Research and Experimental Station at Lyamungu, Moshi. The small Arusha-Mbulu native Mild Coffee crop in 1944/45 was a record but a sharp drop is expected in 1945/46. The small Rungwe and Mbosi crops were above average.

(b) *Estate Coffee.*—There is no doubt that now that the war is over the investment of new capital in coffee estates will be necessary. The lowered standard of cultivation enforced by the "hungry thirties" and during the war years due to scarcity of chemicals for pest and disease control, shortage of labour, machinery scarcity and competition of other crops more necessary for the war effort, has affected the coffee industry in common with others and rehabilitation of cultivation and equipment is overdue. The results too of experimental work at the Coffee Research and Experimental Station have revealed that cultural practices of coffee can be greatly improved, but fresh capital outlay will be necessary to inaugurate these improvements.

The average export of the Estate production in the Northern Province was maintained, being 2,558 tons in 1944/45 and 2,992 tons in 1945/46. The production in Mbeya district of the Southern Highlands had an upward trend with the 1945 crop reaching 609 tons. All mild coffees continued to be marketed by the Government agents, the Tanganyika Coffee Growers' Association Limited. The crop continues to be sold to the Ministry of Food under contract, and for the last two years it has been classified into qualities on the result of liquoring tests. This method has been a distinct advantage to Tanganyika mild coffee and the reports so far received reveal an improvement in both estate and native mild coffee in 1945.

Cotton

After two successive bad seasons in the Lake Province the 1945 season showed a very satisfactory improvement. The crop of 35,378 bales was slightly above the average production for the period 1939 to 1944. In the southern portion of the province the crop was able to mature itself in the absence of the usual heavy stainer attack. Altogether, in comparison to the production of other crops, cotton has demonstrated its drought resistance this year in the Lake Province.

The Eastern Province experienced almost the worst season on record. Late planting, owing to adverse weather, and an inordinately heavy infestation of insect pests in the main cotton producing area of Morogoro and Kilosa have all contributed to the sharp fall in production.

Unfavourable weather conditions prevailed also in the other cotton areas and very poor yields were obtained. The following are the production figures for all areas in bales of 400 lb.

Province	Average for six years	1944	1945
Lake	34,316	17,185	35,378
Eastern	13,281	5,944	4,835
Northern	2,300	695	304
Tanga	1,553	223	114
Southern	1,197	750	777
	52,647	24,797	41,408

Copra

The unsatisfactory state of this industry has made necessary the enactment of various forms of legislation with a view to improvement of grading and production standards. Financial assistance too has been given to owners of plantations to erect kilns for drying copra; but the fact remains that the location of the industry along the coast, within and on the outskirts of the larger towns coupled with the ignorance and indifference of copra dealers have resulted in little improvement in the standards of the production of the commodity. Land tenure too plays its part and the ownership of a few palms only by individual natives who do not own the land they stand on, so that there might be a hundred owners of less than a thousand palms, makes supervision for improvement exceedingly difficult.

In spite of this, however, in the Tanga Province very definite improvement can be recorded. The production there verges on 4,000 tons of copra annually and in 1944 a voluntary system of grading has given a fair improvement in uniformity of quality of production. The recent enactment of an Ordinance to control the gathering of coconuts and the manufacture of copra, and which provides for the licensing of dealers in copra for the purpose of improving the quality of copra and also for other incidental matters, will tend further to improve production standards when it is fully enforced. A period of education in the implications of the ordinance is, however, necessary before full enforcement is advisable.

In Kilwa district of the Southern Province a great deal of work was done to enforce proper plant sanitation in the plantations and excellent progress can be recorded in reducing the ravages of the major insect pests in the palms.

Production figures in 1945 reached a total for the three producing provinces of the territory of 10,000 tons. Practically the whole of the production was used locally.

Oil Seeds

The groundnut crop has been steadily declining during the last ten years, more particularly in the Lake Province which formerly was the principal producing area. In 1936 the Lake Province produced 10,000 tons of groundnuts for sale. In the early 'forties it averaged around 3,500 tons and then production fell to 1,700 tons in 1943, while this year only 460 tons was sold on the markets. In the Western Province a similar state of affairs has prevailed, the crop falling

from 7,500 tons in 1936 to 1,100 tons in 1945. In the other provinces the Southern Province alone has maintained its average of 1,700 tons over the years.

Adverse weather has of course played its part in this decline but other factors also have been important, the chief of these being the growth of production of other crops, and the difficulty of impressing upon natives the necessity of keeping sufficient seed unshelled in times of food shortage for the following season. Earlier maturing varieties too are necessary and while these have been introduced and acclimatised in some volume from time to time, the seed more often than not gives place eventually to the local type. The latter gives a plumper, heavier nut and yields better in years of extended rainfall, but in the dry years, which must be regarded as normal over the Lake and Central areas of the Territory, the native type fails. A great deal of local experimental work is necessary and introduction of additional shorter maturing varieties will have to be undertaken when the staff position in the Department becomes normal once again.

Sesame is produced principally in the Southern Province and in that area 1939 and 1943 were record years with production for sale exceeding 5,000 tons in each case. In 1945 the crop reached the usual average of 3,200 tons. The improvement in type of seed from the dark and mixed buff seed giving a dark oil, to the "white" seed which gives a light coloured oil has been in abeyance during the war and its resumption also depends upon the staff position becoming normal once again.

Castor seed and soya beans continued with normal average productions in 1945. The former is not cultivated but is gathered from the scattered bushes found within economic distance of the railway. Soya beans are confined to the Bukoba district.

Grains

During the war a system of providing food for labour, and native population in towns, has been instituted by means of which substitutes are given in place of items that are short, so that if maize is unavailable, millet or wheat or cassava or any other cereal that is more plentiful replaces it in a quantity calculated to give an equal nutritional value. The African labourer and townsman has thus come to be fed what is now known as "African staple." An idea of the food production of the Territory for sale can be gathered from the fact that during the last few years from 30,000 to 35,000 tons of African staple has had to be imported. The Territory cannot be regarded as a large grain producer but production must be increased to cover the short fall in production that has to be imported, and it is patent that acreage has reached more or less its limit with the present population. Production must be increased by the more intensive and better farming methods the extension of which has been of necessity largely in abeyance during the war.

(a) *Rice.*—Before the war the Territory's export of rice averaged around 6,000 tons with a peak exportation of just on 10,000 tons in 1939. In 1940, 1941 and 1942, with the great war-time need of this commodity, export expanded to 15,000 tons in 1940 and just on 18,000 tons in each of the years 1941 and 1942. Since 1943, however, the crop has seriously declined until in 1945 exports have fallen to 2,000 tons. The reason for the decline is adverse seasons in 1943, 1944 and 1945. Both the Lake and Eastern Provinces the main producing provinces, have had three seasons of severe conditions for borderline areas of rice. A further important factor in the falling off of the

crop, however, must be attributed to the hard work involved in rice growing, and, with good war-time prices prevailing for other crops involving less hard work the native is becoming inclined to plant sufficient only for his own food. It must not be overlooked too, that in the last three years local consumption of rice, by an increasing Asiatic population of the Territory, and especially with a wealthier African town population, has extended, making less available for export.

(b) *Wheat.*—Wheat is produced by both natives and non-natives. The production is mostly in the Northern Province, though the Southern Highlands Province produces a small quantity. Before the war production was far below the needs of the Territory which was estimated at 40,000 bags of white flour annually. Since the outbreak of war, however, the need to make the Territory self-supporting has caused rapid expansion. In 1942 a Government financed scheme for large scale production of wheat in the Northern Province was inaugurated. In 1944, 14,500 acres of wheat were harvested on this Northern Province Wheat Scheme and this acreage was increased in 1945 to 22,000 acres.

The season for wheat in the Northern Province in 1945 was not entirely a good one and a drop of 7,000 bags occurred in the production of planters. The Southern Highlands Province also had a poor season but Songea native wheat had an excellent season.

Production of wheat by years in the Northern Province is shown below :—

	Native and Non-native Farmers	Northern Province Wheat Scheme	Total
	Bags	Bags	Bags
1939 ...	17,030	—	17,030
1940 ...	17,225	—	17,225
1941 ...	23,735	—	23,735
1942 ...	34,200	—	34,200
1943 ...	36,730	—	36,730
1944 ...	43,450	45,000	88,450
1945 ...	36,168	75,208	111,376

Production of wheat for sale in other areas amounted to 6,347 bags by natives in Songea and 1,210 bags by non-natives in Iringa.

(c) *Maize.*—The season was a favourable one for the growth of maize in the Northern Province and a production for sale of 102,000 bags was achieved in that area. In other areas, however, the production suffered from adverse weather and it fell in all provinces. The total production of maize for sale was approximately 225,000 bags.

(d) *Millets and Sorghums.*—The largest production of sorghum grain for sale is usually in the Southern Province, but there the surplus fell from the average of 44,000 bags to 11,300 bags owing to bad distribution of rain in the crop season. In the Central and Lake Provinces, sorghum and millet is an important item of food and there also the surplus was disappointing.

Tea

Production of tea is centred in three areas, namely the Eastern Usambaras, Mufindi in the Iringa district and near Tukuyu in the Rungwe district. In 1934 when the Tea Restriction Ordinance was first introduced the acreage of tea in the Territory stood at 2,500. Since then three further allocations have brought the total to 8,940 acres but some of this is still too young for any appreciable production. In 1942/43 two new factories were built by the Tanganyika Tea Company, one at Mufindi and one in Rungwe, each approxi-

mating £40,000 in cost. These factories incorporate the most modern design in manufacture arrangement which makes them among the most up to date in the Empire. With the exception of one estate all the tea produced in Tanganyika Territory is marketed by Messrs. Brooke Bond (East Africa) Ltd.

The season of 1945 brought a further drop in the production of the Usambara tea which has now fallen by 170,000 lb. of made tea since 1942. Failure of the short rains was responsible in 1945 and in the other years adverse distribution of rain was also the cause. In the Southern Highlands a promising season in 1945 gave place to dry unproductive weather but later a heavy autumn flush raised production to a fair level. The total production of made tea in the Territory during the last four years was as follows:—

	lbs.		lbs.
1942 ...	1,416,894	1944 ...	1,149,049
1943 ...	1,288,554	1945 ...	1,277,714

Sugar

There is only one estate producing white sugar in the Territory and this is situated at Arusha Chini in the Northern Province. There are a number of small plants situated in scattered localities of the Territory producing jaggery. Production fell in 1945 on the Northern Province estate from 7,700 tons to 7,300. The beetle, *Cochliotis melolonthoides*, caused some damage to cane, and also soil troubles, caused by concentrations of salts, are affecting production.

The present limitation of production of sugar by legislation was designed before the war at a time when production was in considerable excess of demand making control of export necessary on a world market already over supplied. Present indications are that additional production will be necessary in the near future to cope with an increasing local demand. As in many other tropical countries there are areas of unexploited sugar land of excellent quality.

Tobacco

(a) *Fire-cured.*—In Biharamulo of the Lake Province, where the crop is relatively small, 194,880 lb. was handled by the Native Authority packing and grading plant. The crop was a good one having had good seasonal weather.

In Songea District of the Southern Province the worst season for some years was experienced and the crop was reduced considerably by too much rain out of season, and food shortage too, from unseasonable rain, caused pre-occupation with the planting of root crops with consequent less attention to tobacco planting. The Songea crop is handled, under a Native Tobacco Board, by the Ngoni-Matengo Co-operative Marketing Union, Limited, a union of fourteen co-operative societies, designed to carry out co-operative grading, baling and marketing of the crop. This Union is in need of re-organization to enable closer and more extended supervision of the industry to be carried out, particularly in the collection and the growing and curing of the crop by the individual native cultivator, and this is in train. Production of baled leaf and strips for sale was as follows.—

	lbs.		lbs.
1933 ...	2,000	1940 ...	963,200
1934 ...	13,440	1941 ...	790,920
1935 ...	71,680	1942 ...	694,400
1936 ...	235,200	1943 ...	1,046,080
1937 ...	268,800	1944 ...	385,280
1938 ...	398,720	1945 ...	351,680
1939 ...	862,400		

(b) *Flue-cured*.—This non-native industry, situated around Iringa in the Southern Highlands Province, sprang up during the war in consequence of a demand in East Africa (arising from the difficulties of shipping) in obtaining tobacco supplies that were previously imported. The acreage is limited by the Emergency Regulations to keep it in step with available labour and food supplies. The industry is governed by the Non-Native Tobacco Industry Ordinance, No. 17 of 1941, by means of which a Tobacco Board of growers imposes a cess to cover the cost of grading and baling the leaf in a centrally situated factory. This factory is managed by an officer seconded by Government and paid partly from the cess and partly by Government. Marketing of all the flue-cured tobacco production proceeded more or less without difficulty until the end of 1944, but this year local buyers found themselves unable to continue to take all the leaf produced and overseas marketing had to be attempted. To this end a more elaborate conditioning plant was installed and at the close of the year under review all the tobacco amounting to 1,310,920 lb. had been disposed of. The local market absorbed 890,403 lb. only and 420,517 lb. has been sent overseas. The figures of production since 1939 are shown below :—

	Tons		Tons
1939 ...	34,200	1943 ...	1,132.731
1940 ...	66,100	1944 ...	1,523,669
1941 ...	323,481	1945 ...	1,310,920
1942 ...	814,299		

Pyrethrum

The crop is grown by European estates in the Northern and Southern Highlands Provinces and is marketed by the Kenya Farmers' Association. It is governed by the Pyrethrum Industry Ordinance, 1939, by means of which a Pyrethrum Board of planters manages the affairs of the industry and levies a cess for the benefit of the industry. The area planted by any planter is limited by law to that considered by the Director of Agricultural Production to be in line with available native labour and food supplies and in accordance with the terms of the contract with the Ministry of Supply. The season in the Northern Province was a good one though labour shortage caused some loss at one period of the year. The yields in this area are high ranging up to 1,200 lb. per acre and there is no sign of their diminishing. In the Southern Highlands the average yield is not more than 300 lb. per acre only, nevertheless total yield greatly increased during the year owing to new permitted acreages coming into flush for the first time. Production over the years has been :—

	Tons		Tons
1939	100	1943	306
1940	243	1944	396
1941	229	1945	*799
1942	305		

*Southern Highlands 441, Northern Province 358.

Papain

This is produced in the Northern Province and the acreage has been limited during the war. The present acreage is around 3,650 acres and yields since 1939 were as follows :—

1939	10,480 lb.	valued at	£ 3,500
1940	20,646 ,,	,,	£ 6,700
1941	40,320 ,,	,,	£ 8,200
1942	50,400 ,,	,,	£23,300
1943	77,280 ,,	,,	£35,740
1944	91,840 ,,	,,	£42,475
1945	109,760 ,,	,,	£49,392

Seed Beans

These are produced entirely for export for the vegetable seed trade. The industry is a specialized one and is confined to a number of plantations in the Northern Province. Considerable improvements in cultural methods and machinery were carried out in 1945. Annual production of seed beans reached 200 tons in 1939 and continued at that level until 1941. In 1942 export rose to 328 tons and in 1943 again to 528 tons. In 1944 production exceeded 400 tons and in 1945 was 490 tons. In the year under review shortage of fumigants made control of insect pests difficult.

Onions

The main production is in the Northern Province and there the crop totalled 2,200 tons, the value of which was some £35,000 to the growers. The crop suffered from drought and thrips in the Moshi area but in other areas did well.

OTHER CROPS AND PRODUCTIONS

Beeswax

This is a most valuable product and had a high priority during the war. Prices were stabilized in 1942 when Government took over control of export on behalf of the Ministry of Supply. Analytical standards are laid down for wax that is exported. The three main producing areas are the Western, Central and Southern Provinces. Generally the rains of one year are the deciding factor in the wax production of the succeeding year hence the record production of 1943 was the result of favourable weather in 1942, and the low production of 1945 is due to the poor rains of 1944.

	Production tons	Export tons	Value in £
1942	410	348	57,640
1943	980	586	102,603
1944	540	627	110,276
1945	255	795	132,297

Honey

Before the war honey was collected for local consumption and there was a small export to Kenya and Zanzibar. In 1940 a demand arose for feeding troops and prices rose to a level that made possible the export of the commodity from the remote areas. The rise has been phenomenal as shown by the figures below :—

	Export in cwts.	Value in £
1939	554	568
1940	6,729	10,402
1941	3,008	4,343
1942	2,357	3,464
1943	17,355	31,848
1944	3,462	6,430
1945	3,045	5,690

Mylabris Beetles

The collection of these beetles for extract of the drug *cantharidin* was organized to replace supplies formerly obtained from China and Mediterranean areas before the war. The insects run about 1,000 to the lb. when dry, and the price paid to natives has been Shs. 2/- per lb. The beetles are killed by immersion in hot water and dried in the sun. While the occurrence of these insects is fairly widespread in the territory it is usually only in the Lake

Province that they are sufficiently concentrated for collection and the occurrence is for limited periods only. In 1945 production reached 1,200 lb. It is doubtful if this minor industry will survive the return to peace-time conditions.

Gums (Copal and Arabic)

A drop in the export of gums occurred after the phenomenal shipments in 1944, nevertheless exports reached a high figure. Export figures for the last eight years were :—

	Tons	Value in £
1938	1,274 ...	29,392
1939	1,311 ...	28,258
1940	965 ...	25,398
1941	1,405 ...	46,754
1942	904 ...	40,107
1943	390 ...	21,916
1944	2,567 ...	114,657
1945	1,712 ...	107,274

The bulk of these figures is for gum arabic but include gum copal. The principal producing areas are the Lake and Central Provinces.

Cinchona

A special organization for carrying out cinchona research has been inaugurated in Tanganyika with headquarters at Amani. The organization will eventually be on an Empire basis. The area under cinchona is at present less than 1,000 acres but this is increasing. Production in 1945 was 71 tons of bark. At present all bark is consigned to the Government factory at Dar es Salaam for the manufacture of Totaquina and the price paid to growers approximates £133 per ton for dried bark containing seven per cent total alkaloids.

Rubber

Prior to the first world war the Germans had engaged in rubber planting on some scale. Contrary to expert opinion *Ceara glaziovii* from the Ceara province of Brazil was established rather than *Hevea braziliensis*. In any case the rubber slump following the first world war caused the then owners of the estates to either abandon the rubber or to uproot and engage in sisal planting. In 1942 there remained some 32,000 acres spread over one hundred and sixteen estates, all the rubber trees being in abandoned condition, overgrown by bush and inhabited only by wild animals. The need for rubber was, however, great. A commencement was made in 1942 to clear up the more accessible areas and under managing agents and staff collected in spite of man-power difficulty, production was started. Tapping difficulties, machinery shortage, transport as well as labour shortage were all coped with in turn and production was speeded up. Exports have been :—

	Tons		Tons	
1942 ...	213	1944 ...	1,314	
1943 ...	451	1945 ...	2,320	With a value of £303,851

Fruit

Citrus.—A considerable expansion of citrus cultivation has occurred at Muhesa in the Tanga Province. Marketing is carried out under Government supervision. During the war the principal buyers of these oranges were the East African Supplies Board and latterly the Kenya public market is being explored. Production has been :—

	Tons
1943	2,000
1944	1,549
1945	1,490

Other Fruits.—One thousand two hundred tons of bananas were exported to Mombasa from the Tanga Province during the year. 130 tons of plums and peaches, and 800 tons of mangoes etc., were also sold from the same area.

Onion Seed

The total production of onion seed in the Northern Province amounted to 1,510 lb. The seed is produced by Government for sale to native and other producers of onions. The low production was due to a severe infestation of onion thrips. In 1944 the project produced 5,150 lb. of seed.

Potatoes

English type potatoes are grown commercially in the high altitude areas of the Northern, Tanga, Eastern and Southern Highlands Provinces. During the last two years the crop has suffered from late blight throughout the Territory and an importation of reputedly blight resistant seed is now on trial. Purchases of potatoes in local markets in 1944 were in the region of 2,000 tons but in 1945, owing to late blight, production for sale dropped to less than 200 tons.

Vegetables

Vegetables are produced in all areas but the main production for sale is in the Tanga and Eastern Provinces; a certain amount also is produced in the Southern Highlands Province mainly for refugee camps in that area. In the Tanga and Eastern Provinces the production approximates 1,600 tons annually.

Cashew Nuts

Normally the unshelled nuts are exported to India where they are treated, shelled and the finished product is then re-exported to America. During the war the United States Government would not furnish the necessary shipping freight and this method of disposal was no longer available, but in 1945 a demand had again arisen which has absorbed not only the current crop but accumulated stocks as well. The product is confined to the coast provinces, the Southern and Eastern including Mafia Island. Exports in 1945 were 2,669 tons valued at £43,958.

Colombo Root

This is the dried root of *Jateorhize palmata* and it is exported and used medicinally for its tonic and astringent qualities. Production is along the Ruvuma River in the Southern Province and has been as follows:—

		Tons	
1943	...	67	
1944	...	192	
1945	...	346	Valued at £6,875

Native Starch

This is prepared in the Southern Province by natives from wild roots mostly on the Makonde Plateau. Annual production in 1943 and 1944 was around 250 tons but this fell in 1945 to half that amount.

Kapok

This crop suffered in all areas, from excessive rain in Tanga Province and dry weather in other parts, and production has dropped. Actually comparatively low prices are the main cause of a fall in production. Production in any case is small—in the region of 200 tons—and this dropped in 1945 to some 140 tons.

Derris

Export of this amounted to 39 tons as compared with 15 tons in 1943 and 16 tons in 1944. The present plantings should maintain a crop of 30 tons a year for the next four years. The crop is exacting in its requirements of soil and climate, and areas suitable for it are not extensive.

Essential Oils

Various essential oils are produced in the Northern, Tanga and Eastern Provinces. There are several types; amongst others are the oils of eucalyptus, bitter orange, camphor, geranium, lemon grass, dill, fennel and coriander. The total exports from the Territory in 1945 amounted to: (a) Lemon grass 15,303 lb., valued at £8,560; (b) Bitter orange oil 6,528 lb., valued at £4,896; and (c) others, 1,086 lb., valued at £587.

FOOD CROPS AND NUTRITION

The primary duty of the department must be directed to the maintenance of adequate food production by the population to feed itself. The vaster portion of Tanganyika Territory, except for the highlands, like most of the other semi-arid regions of Africa, is subject to drought and floods. The Territory, however, is large and when one or other of these occurs the effect is not territorial but is normally confined to a section. Locusts too take their toll in some years and vermin such as wild pigs, monkeys and baboons as well as rats and field mice are a frequent cause of heavy loss in spite of the efforts of those concerned to protect their crops. Generally, however, a balance is maintained and when losses occur in one area there is plenty not far off to offset the loss, and the peasant on his own shamba usually has a sufficiency to eat either from his own efforts or he has had sufficient in the proceeds of a cash crop to enable him to buy from his neighbours what he has not grown for himself.

The usual insurance against shortage of food is to plant root crops, either cassava or sweet potatoes, and in some parts where suitable wet patches occur, dry weather gardens of grain are planted in drained swamps. Apart from their resistance to drought these root crops are damaged less by locusts than are other crops so that the planting of them, as now advocated by the Department for many years, is a double insurance against both drought and other losses, and the success of this Departmental policy can be seen in many parts of the country. Every peasant is urged, and in most areas he is bound by his own tribal orders, to have an area of root crops wherever they will thrive. The enforcement of this, however, requires constant attention, for it can be seen in several areas that the absence of drought or locusts soon gives the native a false sense of security and as one year of plenty follows another his area of root crops tends to become smaller or disappear. Constant campaigns to ensure root crop planting are waged and 1945 was no exception.

While the improvement of the diet of the peasant has made some progress during the war a great deal still remains to be done. To this end the Department has fostered vegetable growing in many areas and progress can be recorded in native vegetable production in Morogoro, Rungwe, Mbeya, Lushoto and Moshi where natives not only grow European vegetables for sale to Europeans, but eat them themselves. Many new types of food crops have been introduced such as soya beans in Bukoba and potatoes in the Highlands and in those areas progress can be recorded, nevertheless there remains much scope for work in the field of diet improvement temporarily held in abeyance by the war.

In the extension of food crops for sale, great progress has been made but greater progress is still necessary. The extension of planting by Europeans of sisal, pyrethrum, tobacco and such crops, and the continual and increasing drift of natives to the towns, has given rise to a greater demand of saleable food by people who do not themselves produce food. "African staple", described earlier in this report, is not produced in sufficient quantity and some 30,000 tons may have to be imported annually. Acreage increase of African field crops has been increased over the years to practically the limit under present conditions of fertility, and it is only by more intensive cultivation and better methods that this 30,000 tons can be made up. The Department of Agriculture must, if it is to perform its duty, consolidate the gains in acreage and continue once again to base its policy on proved methods of better agriculture and not, as the war need and consequent staff shortage dictated, on a greater acreage. To this end staff increases are planned and a greater measure of experimental work is in train, now that the war is over, for improvements of food crops and introduction of new ones.

ANIMAL HUSBANDRY

In order to consolidate the gains the peasant has made in average acreage increase over the years and to inculcate a system of permanent agriculture into native tribal life throughout, it is necessary to extend the use of cattle manure. In some areas good progress has been made but it is very necessary to make animal husbandry much more a part of farming than is general amongst the African cultivators. To this end, wherever possible, the Department has always, in co-operation with the Department of Veterinary Services and Animal Husbandry, worked towards linking animal husbandry in peasant agriculture with the farming of the soil. At all the principal Experiment Stations and Agricultural Development Centres herds of dairy or draught cattle are kept and notably at Lyamungu and Ukiriguru teaching of compost making and the care of cattle is a part of the regular extension work. In addition a herd is in course of establishment at the Mahiwa Station near Lindi in the Southern Province in an area where natives do not keep cattle at all but where there are indications that they can be kept.

A further problem in connection with stock keeping presents itself and becomes more pressing with time; it is the overcrowding of stock and population to the point where soil fertility suffers. Especially is this true in the Lake Province where concentration of stock and population have reached so high a density in some villages that soil fertility has reached a very low state. There are areas where voluntary movement of people and animals occurs, but even there the movement takes place when soil fertility has reached a stage that requires very many years of resting to rehabilitate it, even if

such be possible. What is required is movement before the damage commences. It is axiomatic that there is no method of maintaining a soil that does not include a period of resting, the period depending on the state of the soil at the outset, but in many parts no resting is possible and a state of saturation has been reached in the overcrowded parts of Sukumaland, the Ulugurus, and the Usambaras, where only compulsory movement of people before it is too late will enable the peasants to maintain their lot, let alone improve it.

SECTION II.—DETAILS OF ASSISTANCE AND PROGRESS

In 1939 the organization of the field officers of the Department into "Circles" for supervision was completed and these were then under four Senior Agricultural Officers as follows :—

Circle: North-Eastern.
Comprising: Northern and Tanga Provinces.
Circle Headquarters: Moshi.

Circle: North-Western.
Comprising: Lake and Western Provinces.
Circle Headquarters: Mwanza.

Circle: South-Eastern.
Comprising: Southern and Eastern Provinces.
Circle Headquarters: Dar es Salaam.

Circle: South-Western.
Comprising: Central and Southern Highlands (later Songea of the Southern Province was incorporated).
Circle Headquarters: Mbeya.

As development in the Territory proceeded these circles were found to be too large for a Senior Agricultural Officer to handle and in 1942 a commencement was made to abandon the "Circle" system. By 1944 arrangements were completed for the Department's staff and activities in each Province to be under the charge of a Senior Agricultural Officer, together with one extra at the Headquarters of the Department to assist in the central administration.

At the outbreak of war the Headquarters of the Department was moved from Morogoro to Dar es Salaam and occupied the Audit Building. At the close of 1945 a new temporary building was, however, completed, and it has now been established that the Headquarters will remain at the seat of Government.

In January 1945 a conference of the Senior Agricultural Officers with the Director and Deputy Director was held at Lyamungu, Moshi. The Chief Scientific Officer and the Plant Pathologist were also able to be present during such parts of the proceedings as were of interest to their particular activities. A great number of points of policy and other matters were discussed covering soil conservation, co-operative societies and their relation to the Department, agricultural policy for Africans, vermin control and depredations by birds, mechanical cultivation and collective farming for natives, communal grain reserves, the co-ordination of general experimental work, agricultural statistics, the improvement of food crops, agricultural literature for Africans,

training of African Instructors, agricultural training for ex-servicemen, agricultural education, post-war non-native settlement, agricultural policy in sleeping sickness resettlement, the relationship between animal husbandry and agriculture, development maps, produce marketing and a number of Departmental matters. A report of the findings of the conference was subsequently circulated, and aroused much interest both in the United Kingdom and in certain of the Dominions and Colonies.

A list of the European staff of the Department is given in Appendix 1. There are also employed 11 Asiatic clerks and one office assistant. The native staff employed is as follows:—

African Agricultural Assistants	4
Recorders	54
Experiment Surveyor	1
Mechanics	4
African Instructors (L.C.S.)	423
African Instructors (W.P.S.)	566
Laboratory Assistants	5
Overseers	28
Motor Drivers	4
Clerks	32
Messengers	35

In some districts the African field staff is further increased by employees of Native Authorities. The system has much to commend it but on the other hand the conditions of service are such that generally the best type of man is not attracted to the work because more often than not the Native Authority employees are engaged at a fixed wage owing to the fact that the limitation imposed on recurrent expenditure in Native Authority budgets precludes incremental scales. On the other hand in many areas the Native Authority Instructors are in effect working to qualify for appointment in the Department when vacancies occur.

During the war, and to assist in increasing production, the Department has employed extra Instructors under the heading of War Production Staff. These are over and above the Local Civil Service appointments and are temporary. It has become increasingly obvious, however, that the Instructor staff of the Department must be increased if systems of permanent agriculture are to be extended and established among the peasants, but it has been difficult to attract the right type of man unless his employment is made more attractive. The difficulty arises primarily in that men who have obtained the necessary standard of education prefer clerical and similar employment. Of recent years scales of pay have been increased and more of the right types are being engaged but difficulties have arisen in the training of the men. In order to overcome this, training has been going on for some years in the Lake Province, at the Ukiriguru Instructors' Training School, but the rate at which the trained men are turned out is much too slow to be really effective. The course at the School has been of two years' duration and the curriculum has embraced the elements of agriculture in practical and theoretical form with instruction in the actual duties of an Agricultural Instructor. The course is now to be extended. In 1945 plans were approved to enlarge the institution at Ukiriguru in 1946 at a cost of £25,000 and to maintain an Instructors' training school there on an enhanced scale. In addition coffee Instructors will be trained at Lyamungu, near Moshi in the Northern Province, and the purchase of land and construction of buildings are approved there also for 1946. It has further been approved in principle that similar schools will be established

for coastal conditions at Ilonga in the Eastern Province and one also in the Southern Highlands for high altitude conditions. The goal of the Department is to have 2,000 Instructors properly trained and employed, to work among the native cultivators in the various districts of the Territory. This goal will no doubt take some years to achieve, nevertheless the Instructor staff, so often described as "the front line" of the Department, is in course of being considerably, and necessarily, extended and improved on definite and defined lines.

Central Province

The Headquarters of the Senior Agricultural Officer is at Dodoma and the Province is staffed in addition by four other European officers, twenty-two Staff Agricultural Instructors, seventy-three temporary War Production Agricultural Instructors, three Recorders, a messenger and a clerk. In addition the Native Authorities employed an average of ninety African Instructors.

In recent years the Province has suffered from drought and in 1943 a disastrous famine occurred when many thousands of tons of food had to be imported to feed the population. A commencement was therefore made to build permanent communal grain stores at scattered centres throughout the areas that are prone to drought, so that reserves could be built up to counteract famines when they occur. The total tonnage of grain that can now be communally stored is 1,550 tons and plans are made and funds provided so that by the end of 1946 the total capacity will be extended by 3,450 tons to 4,900 tons.

The rainfall in 1944/45 season was unevenly distributed. There was far too much rain in the first half of the season and far too little in the second half when grain was heading, and, while statistics show that the aggregate rainfall was normal, crops were adversely affected. The result of this was local food shortages in scattered areas and some shortages in settlements and towns. Progress has been made both with extension of sweet potato planting and with the use of cattle manure, and progress too is recorded with the issue of new seed of Dobbs short term sorghum produced at the Native Authority farms. Bulrush millet is also becoming popular in such areas where short term crops are demanded by frequent droughts.

Progress continues to be made in combating erosion. Many miles of contour banks were constructed on cultivated land and extension of ridge cultivation and tie-ridging was carried out. A fruitful cause of erosion is roads and here also progress was made in combating run-off on to roads and from them. The main areas of the Central Province are occupied by cattle-owning tribes and the concentration around water supplies is one of the main causes of erosion. The method adopted to combat this is by controlled closure to grazing for a period. This system was extended in 1944 but was not increased in 1945. On the other hand an increased number of wells and surface dams were constructed in all districts of the Province with a beneficial reduction in stock concentration.

Rules under the Native Authority have been passed and approved by Government which control emigration and immigration in various areas of the Irangi Plateau. This is a great step forward in encouraging the commencement of the necessary movement of population into areas that are not overcrowded out of overcrowded areas. The subject has been dealt with earlier in this report and the Native Authorities concerned are to be

congratulated on this progressive step, for not only in combating soil erosion are these rules so necessary, but also in combating the menace of the tsetse fly which this Province faces.

Eastern Province

The Senior Agricultural Officer is stationed at Morogoro. The average staff comprised, in addition to the Senior Agricultural Officer, eight other European officers of whom two are Agricultural Officers, five are Agricultural Assistants and the remainder temporary men. One Asiatic clerk is employed and the native staff consisted of seventy three permanent Agricultural Instructors, eighty nine temporary War Production Instructors and four clerks.

The season in 1945 in this Province was an exceedingly difficult one in all the inland areas, though the narrow coastal strip experienced fairly normal weather. Crop production in the usually productive hinterland areas was such that marketable surpluses were small, available foodstuffs at the end of the season were very low and several areas suffered acute food shortages. The rice crop fell from over 4,000 tons to less than 1,000 tons. Sorghum grain which had a marketable surplus of just short of 3,000 tons in 1944 fell to 500 tons and maize fell from nearly 9,000 tons in 1944 to just over 4,000 tons while the cotton crop which was 9,800 bales in 1943, in 1945 was only 4,700 bales.

In soil conservation work the principal areas needing attention are the Uluguru and Nguru mountains and here little progress is recorded, due mainly to the apathy of the population, though tribal turnouts laid down demonstrations of tie-ridging. The declining cotton crop in the Province is a matter for grave consideration. It is to a certain extent bound up with insect pests. The commencement of the Ilonga Experiment Station and the stationing of an officer of the Empire Cotton Growing Corporation there should do much to throw more light on the problem, though the basic knowledge of the shape future investigations must take has already been acquired by this investigating team of the Empire Cotton Growing Corporation who have been previously engaged on the problems at Morogoro.

Copra in the coastal belt continued its average production around 5,000 tons.

Sisal production on the Central Line area of the Eastern Province was more than maintained, and though the planting community have done a considerable amount to provide food for the industry the greater bulk continues to depend on native production. Non-native cotton has practically disappeared in this Province since the outbreak of war, so that the planting community at the present time is almost entirely engaged with sisal production.

In the Kilombero Valley the work of re-settlement on account of sleeping sickness continues to make progress. There are now nine settlements and the work has become an annual feature of the Ulanga District. In other "fly" infested areas little progress can be recorded. The Kingolwira native peasant settlement has been closed for the time being.

Before embarking on settlement schemes it is essential to work out a balanced system of African agriculture whereby it is no longer necessary to resort to shifting cultivation. Unfortunately this was not done at the outset and the deterioration of what at best was a soil of poor fertility coupled with the general unsuitability of a very mixed lot of settlers has rendered the

present scheme abortive. In view of the fact, however, that considerably more than half the Territory is inundated with tsetse it is necessary that a properly considered scheme to determine the economic area necessary to maintain an African family on its own plot of land under these conditions must be worked out. There can be no real social progress amongst Africans as long as they are required to resort to shifting cultivation.

Lake Province

The Senior Agricultural Officer's station is at Mwanza. In addition to that officer, the Ginnery Inspector and two Agricultural Officers, with three Crop Supervisors were stationed in the Province and two officers of the Empire Cotton Growing Corporation cotton research staff were at work in the Lake Province during the year. There were four African Agricultural Assistants, seventeen Recorders, seven Overseers, six teachers, ninety three permanent and one hundred and five temporary War Production African Instructors and nine clerks on duty in the Province during the year.

The season in the Lake Province was patchy. Most of the Shinyanga, Kwimba and South Mara areas had poor crops and a prolonged dry spell in the middle of the season had a serious effect on the paddy crop and reduced groundnuts to a negligible quantity. Coffee in Bukoba suffered from cherry fall but maintained a high figure of production. Cotton showed a satisfactory return to average production. The decline of the groundnut crops in the Lake Province has been steady for ten years as has also the reduction of rice production over the last four years.

Special staff was employed in the Bukoba coffee industry to extend mulching of the gardens and improve pruning, and the improvement recorded is extensive. The small tobacco crop in Biharamulo which operates co-operatively for grading and preparation for marketing had a simplified system of grading applied.

Soil conservation measures are one of the most important features of the Department's work in this province. On cultivated land there was progress during the year in extending contour ridging and cultivation ridging in Biharamulo and Bugufi. Grass strips are being tried out in Musoma. A scheme for the reclamation of land for settlement is under consideration in Bukoba by the provision of improved water supplies. In that area the lake shore is overcrowded. Excellent progress is recorded in Musoma where seventeen new dams were built from funds provided by the Native Authorities.

Resettlement of population because of tsetse fly has continued and notable progress was made with clearing in the Suguti Valley. Resettlement is, however, not proceeding quickly enough to keep pace with regrowth in the clearings. In the Mwanza district shortage of staff caused some unauthorized movement of population into already overcrowded areas but the movement was not extensive. A check of population movement in the Shinyanga district is being made.

The Instructors' Training School at Ukiriguru continued its work of training agricultural staff during the year and turned out 30 men who had passed the required standard of efficiency. The section of the school that is maintained by the Native Authorities of the Lake Province was finally

taken over by Government. Plans for the new school buildings were drawn up by an architect and it is hoped that a start will be made in 1946 to enlarge and improve the school to make an outturn of 120 instructors per annum.

The federation of the Sukumaland Chiefdoms into one administrative union has commenced and when completed will facilitate the work of the team of officers who are to proceed with the scheme for the development and rehabilitation of the Sukumaland Cultivation Steppe. Shortly, this scheme, commenced towards the end of 1945, is to determine the economic re-distribution of population and livestock, the best methods of crop production, manuring, fallowing, etc., and to act on the results of these investigations so as to provide for a contented peasantry on the land built upon a foundation of permanent agriculture. The agricultural part of the scheme in its entirety will cost more than £100,000 over ten years and £17,000 of this has already been approved for 1946.

Northern Province

The Senior Agricultural Officer in charge of this Province is stationed at Moshi. With him in the province there has been stationed during the year an average of two Agricultural Officers, two Agricultural Assistants and one Crop Supervisor. African staff consisted of forty-one permanent Agricultural Instructors, forty six temporary War Production staff and four clerks. One Asiatic clerk served in the Province also.

The season though difficult was not entirely unfavourable for crop production. In Moshi long dry spells caused anxiety at times, but in every case the rains came in time to save the crops from damage, but in Arusha this was not always the case resulting in some damage to crops and the same occurred also in Mbulu; nevertheless food supplies were adequate throughout the Province and record crops of maize, both Estate and Native, were obtained. Pyrethrum and papain production were also well up to expectation. The Kilimanjaro native coffee crop maintained its high average as also did the Estate production.

The work of the Coffee Research and Experiment Station has now established the fact that vegetative reproduction of coffee of proved selections can be profitably undertaken, and plans are laid and a cess to raise funds is approved for the whole of the Native coffee on Kilimanjaro to be replaced over ten to twenty years from proved, selected material which will be produced in nurseries at various central places. This, it is considered, on the data available, in conjunction with multiple stem pruning, improved cultural methods and generally improved preparation will eventually double the coffee crop. The Government sponsored Northern Province Wheat Scheme had a moderately successful year, producing 75,200 bags of wheat. The private growers also had a successful year. Sugar dropped owing to irrigation difficulties but seed beans, cotton, onions and other crops were all maintained at high levels. Soil conservation work made progress especially in Moshi and excellent work was carried out by the Northern Province Wheat Scheme. The prosperity of the Wachagga on the slopes of Kilimanjaro is probably the highest of any native area in the Territory. Their co-operative union, the Kilimanjaro Native Co-operative Union, Limited, which markets their coffee, now has a turnover exceeding some £100,000 and this is largely returned to the native grower. Production Committees did excellent work in 1945 at Arusha and Moshi and their recommendations were extremely valuable to

Government both in the loans etc., recommended and in the application of increased production schemes. A small agricultural show was held successfully at Moshi and aroused competitive interest among local tribesmen and planters.

Southern Province

The Senior Agricultural Officer is stationed at Lindi and one Agricultural Officer, three Agricultural Assistants and two Crop Supervisors were also stationed in the Province. One Asiatic clerk was on duty at the headquarters of the Province and there were thirty four African Instructors of the permanent staff, thirty four temporary War Production Instructors, one Recorder and two messengers.

The season was a difficult one owing to excessive rain. Much destruction of crops occurred from flooding. Sisal production though slightly lower than last season maintained a high average. Oil seeds and sorghum grain were above 1944 production but they were still short of the average and sisal estates and townships were fed only with difficulty and this difficulty was only overcome by the usual supplies of cassava that this Province produces. The season was disappointing for the second consecutive year, for during the war this Province had come to be regarded somewhat in the light of a firm large supplier of food to the Central Line and Tanga planting areas. Generally beeswax is an important export of the Province and this also fell to a low level, but Colombo root was in good supply and the increasing demand for cashew nuts disposed of the current crop and nearly all accumulated stocks.

The most serious problem confronting this Province is the widespread presence of the tsetse fly. It is only in very limited coastal strips that cattle can be kept. Elsewhere except in Songea, cattle do not survive, and in extensive areas of Tunduru, Liwale, Kilwa and other districts sleeping sickness is endemic. The absence of cattle makes maintenance of soil fertility difficult so shifting cultivation or resting of fields is the usual practice. In the Liwale district the population of some 10,000 families living in sleeping sickness country, far from markets and with little prospect of improving their lot, are in process of being settled around Njinjo in the Kilwa District some fifty miles from the coast in country that will support saleable crops. Approximately 1,200 families were moved in 1945 and it is planned to evacuate the whole of the remote Liwale District by the end of 1947 in two further moves.

The Province has for many years produced a fair quality rice among the many varieties and types found there. It is also admirably placed to supply some portion of the firm and extensive demand for rice in Zanzibar. There are suitable valleys and soil and some irrigation also available for extension of the crop. In 1945 therefore a small rice station was commenced in the Lukuledi Valley of the Lindi District and properly surveyed dams constructed to determine the best varieties and the optimum distance of planting. On the results of these trials seed will be multiplied on the station and a simple contour layout for natives will be put in hand in the adjoining valley and other suitable areas in an endeavour to increase the exportable surplus.

During the year a new cotton ginnery was opened by the Kikanda Cotton Company in the Tunduru District. This is a pioneer effort. Cotton production in the Southern Province is, like the Eastern Province, linked up with insect pests as its limiting factor. Except for sisal planting, which is

responsible for more than a third of its exports, the economic life of the Province rests on the export of native produced commodities. These amount to some 16,000 to 20,000 tons in an average year. There is, however, a far larger potential export, hence staff increases in this Department in the Southern Province have been made since the end of 1944 in an endeavour to improve the economic condition of the people by improving their agricultural practices and so increasing their exports and income.

Southern Highlands Province

The Senior Agricultural Officer was moved from Mbeya, the headquarters of the Provincial Commissioner, to Iringa in 1945 for the reason that the estate agriculture is largely located around Iringa and the Senior Agricultural Officer should be in constant touch with the Local Production Committee and with the planting and farming community generally. During 1945 the Senior Agricultural Officer of this Province continued to supervise also the agricultural affairs of the Songea District which is actually part of the Southern Province but it has now been arranged that this district will be supervised from Lindi in the Southern Province as from 1st January 1946. In addition to the Senior Agricultural Officer an average of two Agricultural Officers, one Tobacco Officer, three Agricultural Assistants, one Crop Supervisor and one Stockman were on duty in the Province during the year. An Executive Officer and a Secretary were employed for the Production Committee work. The African staff consisted of fifty-three permanent Instructors, forty temporary War Production Instructors, two Recorders, six clerks, three Overseers and four messengers. In addition seven Native Authority Instructors were employed.

During 1945 extensive damage was done to crops by excessive rain in the Rungwe and Songea Districts. Elsewhere, in Chunya and Mbeya, rain was short but Iringa, and Njombe, to a limited extent, experienced an excellent season. The consequence of flooding in Rungwe was a fall by two thirds of the paddy crop and the Mbeya and Rungwe maize crops were below normal. Iringa alone produced excellent food crops. In Songea the native wheat crop reached the new high level of 6,350 bags for sale but wheat production elsewhere was small.

The native fire-cured tobacco crop in Songea was the lowest for many years, and while the eastern part of the district was fair, the remaining areas were reduced by excessive rain and physiological disease. The acreage planted was small in comparison with other years. The Ngoni-Matengo Co-operative Union, through which the tobacco is prepared and marketed, continued under the management of an officer seconded by the Department. The non-native flue-cured tobacco in Iringa maintained production at a high average level but less than half was composed of the higher grades. With the cessation of hostilities the market for the lower grades is passing and many of the farms on the marginal altitude suitable for this crop will soon cease to produce tobacco that is saleable, so that a reduction may shortly be expected in this crop.

The tea industry had yet another poor season producing a crop below estimate, but a later autumn flush caused the revised estimate to be exceeded. During the year a further 703 acres were allocated to the Province for planting and nurseries were prepared for the planting to take place in 1946. The pyrethrum areas are improved considerably in production, the crop more than

doubling the 1944 tonnage marketed. The yield per acre in the area is much lower than that of the Northern Province; nevertheless it is prosperous and the industry has every chance of remaining a profitable one unless a cheap synthetic product is found to replace the "knock-out" properties possessed by pyrethrum. The non-native coffee industry of Mbosi has produced a new high record crop after many years of struggle with cultural, pruning and other problems. All the estates have now been turned over to the multiple stem system of pruning over the last four years and while many problems remain, particularly in the realms of insect pests and the soil type on which much of the coffee is planted, there appears among the community some renewed hope of a profitable industry becoming established. The native coffee, both in Mbosi and Rungwe produced notably increased crops.

The southern portion of the Province around Lake Rukwa remains the central area for combating the Red Locust, being the principal breeding ground. The International Red Locust Control took charge of that area late in the year and this Department continued to assist in hopper destruction as necessary. Soil conservation work is being overhauled and new rules and powers to make orders have been passed locally and are under consideration by the Governor. Late Blight continues to affect the potato crop seriously. The Iheme Station which was given over to pig production at the outbreak of war has now been virtually closed down and all the breeding and other stock disposed of. Trials in connection with various crops are being carried out on farms in different parts of the Province.

Tanga Province

The Senior Agricultural Officer is stationed at Lushoto and he is assisted in the Province by one Agricultural Officer and three Crop Supervisors. The African staff consisted of fifty one permanent African Agricultural Instructors, sixteen Copra Instructors and forty one temporary War Production Instructors, while twelve Instructors were employed by the Native Authorities.

The rains in this Province commenced late and an unusually long dry spell later caused a poor harvest except in the country south of Lushoto itself and in parts of Handeni. The Chiefdoms in the Northern Usambaras have now experienced three bad seasons and this is not entirely due to poor rains. The country is really over-cultivated and over-grazed and ever-increasing deforestation and erosion is worsening the situation. The only solution is a redistribution of cattle and humans in conjunction with a carefully planned scheme of rehabilitation of the land. Elsewhere in the Province a sufficiency was produced. The Province produces some 59 per cent of the total production of the Territory's sisal exports and as it is in itself unable to feed the large labour force this entails, a total of 16,700 tons of food was imported, this being a rise of more than 6,000 tons over 1944. The main emphasis in African agriculture in the Province has been on root crop planting, and very satisfactory acreages of cassava now exist in most parts of the Province, but in Handeni the position is still far from satisfactory.

Potatoes have been an important crop in the high areas but since the appearance of late blight in the crop a few years ago, it has declined to almost negligible proportions amongst natives. Various varieties of potatoes stated to be resistant to one or more forms of the disease are under observation. During the war the Province produced over 1,000 tons of vegetables annually, mainly for the War Supplies Board in Nairobi, but since demobilization has

commenced this market is disappearing though sales to the public continue. In the valuable native citrus industry at Muhesa changes in marketing took place with a good deal of improvement for the producer. The industry continued to prosper under the laws governing it and agriculturally orchard practice continues to improve. The terms of the Copra Ordinance of 1945 are being very gradually applied to the Tanga industry. Some improvement can be recorded, but much remains to be done to overcome the continued high moisture content in the lower grades whereby the extra weight compensates for the lower price. Grading must start at the producer end and not at the mills. On the other hand some experience of the implications of grading are being given the producer by a voluntary system of grading against the day when the full measures of the Ordinance are enforced. Rules under the Ordinance are awaiting Government's approval and market sites have been selected and when the producers are able to appreciate the terms of these rules they will be legally enforced. Coconut sanitation work among natives made good progress during the year but many non-native estates leave much to be desired. Tung oil, palm oil and essential oil production continue to progress while native coffee produced an average crop. Cinchona has also risen in production and considerable increased acreages were planted during the year. The failure of the short rains caused a drop in tea for the second consecutive year. A further planting of 130 acres took place in the area during the year. Cotton was disappointing, the production falling considerably, and this as well as the decline of the rice crop must be attributed to the increasing number of labourers who go out to work on sisal estates for wages. Ceara rubber production rose by some thirty per cent while minor productions such as derris, cocoa, condiments, papain and roll tobacco were all maintained.

In soil conservation work considerable activity continues. Some 250 miles of contour guide lines were demarcated for cultivators and many hundreds of miles of live contour hedges were planted. But these ameliorative measures are insufficient to cope with the increasing loss of fertility and soil destruction that is occurring in the Western Usambaras. The apathetic attitude of much of the native population to their problems makes the fact most apparent that only legal force can arrest the deterioration of their country to still further and ever-increasing recurrence of famine. Various schemes have been put forward for rehabilitation and rules for enforcement are now under consideration by Government. In other areas of the Province routine measures continue with success. A full scale locust hopper destruction campaign was engaged in at the close of the year under review when large hatching of Desert Locusts occurred. Earlier in the year there were minor campaigns but no egg layings of any great consequence were recorded. The Korogwe District Production Committee functioned during the year and was dissolved at the end of 1945.

Western Province

The Senior Agricultural Officer is stationed at Tabora. He was assisted during the year by two Agricultural Assistants, one Crop Supervisor and a Field Assistant seconded from the Tsetse Research Department. The African staff were four Overseers, twenty one permanent Agricultural Instructors, seventy five temporary War Production Instructors, two Beeswax Instructors and one clerk.

The season was an average one, the rains being somewhat patchy, rather heavy, and prolonged at the end of the period, for optimum grain yields, but they were excellent for root crops. Generally, production of food was adequate but surplus tonnages of rice, groundnuts and pulses for sale were disappointingly lower than average. Sorghum and millet grain, maize, maize meal and cassava were, however, well above average.

Beeswax and honey, of which this Province is the Territory's largest producer, were only fifty per cent of average annual productions but gum arabic was almost double.

This Province has little local market for its surplus food there being only one sisal estate and a few farms in the area. It must depend upon evacuating practically all its produce to the coast and it has no purely economic cash crop like cotton or coffee. The economy of the native has therefore tended to become one based on work for cash wages outside the Province, with his family meanwhile cultivating land for food. The areas endemic to sleeping sickness also are widespread and in the last decade much of the attention devoted to the Province has been in the resettlement of its sleeping sickness affected areas.

The main cash crops are rice and groundnuts and these are capable of extension. The Province has two Agricultural Development Centres partly financed by Native Authority funds for the purpose of producing superior seed for native cultivators and they act also as demonstration and agricultural instructional centres.

EXPERIMENTAL WORK

Coffee Research and Experimental Station, Lyamungu.—In spite of drastic curtailment of staff due to more urgent war requirements two main lines of investigation, namely clonal variety trials and clonal cultural and fertilizer trials, were commenced and developed during the period 1940-1945. These were, however, limited to the Station and all co-operative experiments on estates and native holdings had to be abandoned. In regard to the clonal variety trials, vegetative propagation of potential selections by means of rooting cuttings has proceeded at the rate of some 7,000 a year. Up to the end of 1945 thirteen latin squares of one acre each had been planted, giving some sixty selections under field tests. The earliest planted of these trials were first recorded in 1945 and gave promising results. The surplus clonal material was used for planting out cultural and fertilizer trials in 1940 and these have now been recorded for two to three years. These experiments cover in the aggregate some twenty acres.

The results in 1945 confirm those of previous years but in the abnormal weather of 1945, prolonged drought compost has given increased yields for the first time. It is confirmed, for the conditions at this station, that the following operations economically increase yield, namely, mulching, using sulphate of ammonia in full bearing coffee, irrigating in conjunction with mulching and the pruning of the coffee on the multiple stem system. It has further been demonstrated that animal husbandry fits in well with the economy of a coffee plantation and that, with vigorous culling and good husbandry, herd averages of over two hundred and fifty gallons may be reached with local zebu cattle. The Annual Report of the Coffee Research and Experimental Station, Lyamungu, for the year 1945, is published as Departmental Pamphlet No. 44.

Sisal Experiment Station, Ngomeni.—The ten field trials in progress at Mlingano cover the aspects of cultivation, spacing, cutting and manuring of sisal, and the testing of selected F. 1 agave hybrids. Of these, six represent original experiments now in their second cycle, and they are being continued in order to ascertain the rate of soil deterioration consequent upon continuous sisal growing on the same land. In addition, three complex spacing × cutting trials have been started on outside estates at Rudewa, Kingolwira (Central Line) and Amboni (Coast). First cycle records of all the trials indicate that the total number of leaves produced by a sisal plant does not vary widely whatever the treatment, averaging about 220 leaves per plant. If sisal is allowed freedom of growth through generous spacing or absence of cutting, then total leaf production tends to be reduced to about 210 per plant. On the other hand, checking vegetative development by closer spacing or early and frequent cutting is conducive to raising the total leaf number to 230 leaves per plant.

The cultivation trials emphasise the importance of fostering growth during the young stages. Elimination of competition for soil moisture implies reaping the maximum number of leaves from a plant through curtailing losses of early leaves. Clean weeding throughout the life cycle gave the highest fibre yields but a later trial using the double row system of planting, suggests that a partial soil cover, preferably leguminous, may be maintained during the early years without detriment to the young sisal. Another trial showed that the competition of a soil cover was less serious once the sisal has reached the bearing stage. The original spacing trial has provided striking results. Both total fibre yields per cycle and the longevity of the sisal are closely related to the population of plants per unit area. Plots having 10,000 plants per hectare have yielded over 30 tons fibre per hectare and the sisal has lasted ten years.

The cutting trials proved beyond doubt that postponement of the initial cutting to three or four years is attended by considerable loss of crop. If begun at two years, higher total yields are obtained as the plant tends to produce more cuttable leaf, and the later cuttings have better percentages of extracted fibre. Differences between cutting cycles were not so pronounced. All the experimental data points to the total number of leaves harvested per unit area being a cardinal factor affecting yields. Increased leaf size does not compensate for fewer leaves cut.

Manurial trials have given disappointing results. The only significant response was to nitrogen. The spacing × cutting trial is not yet completed. The trend of yields is following expectations. The most interesting feature to date is that sisal planted in double-rows makes slightly slower growth than that planted in single rows.

The Report of the Sisal Experimental Station for 1945 is published as Departmental Pamphlet No. 45.

The Ukiriguru, Lubaga and Mwabagole Stations, Lake Province, and the Ilonga Station, Eastern Province.—The main cotton experimental work is carried out by the Chief Scientific Officer posted in this country by the Empire Cotton Growing Corporation and he is assisted by two other scientists of the Corporation. The work is carried out at the above-mentioned stations. As the cotton crop is but one of the crops of natives in the areas in which it is grown, these officers necessarily engage in experimental work with other crops which form part of the economy of native agriculture in the areas concerned.

Both for the Lake Province and for the Eastern Province, a fair amount of time in the period since 1940 has been taken up with straightforward Station development and layout as well as with an assessment of the main problems. At Ukiriguru, apart from a very small area, the first hill land, on which much of the experimental work is required, was levelled and brought into cultivation for the first time in 1940. The main area of hill land was not obtained until 1941; the first use was made of it in 1942. In the Eastern Province the original work was concentrated on the settlement scheme at Kingolwira. This in many ways was quite unsuitable. A search was made for a more suitable site for work. Finally, Ilonga, near Kilosa, was chosen and here much heavy bush clearing is necessary.

At Ukiriguru and Lubaga, in regard to fertility, it might be said, as a generalization, that the response from the application of reasonable dressings of manure, around 5-7 tons per acre, is for the first year, both for millet and for cotton, somewhere between a 35 per cent to nearly 60 per cent increase in yield. The second year response might be taken as around a 20-25 per cent increase; only with heavy dressings can a third year response be measured. There must, however, be some slight third year benefit from reasonable dressings. Very heavy dressings of cotton seed ash, probably containing some 15-20 per cent P_2O_5 have given responses, but not commensurate with the heaviness of the dressings. The first resting crop trial came into the cropping cycle in 1945. Millet, following three years of pigeon peas, gave a 45 per cent increase over control; but manured millet, after three years' continuous millet, and millet following manured elephant grass dug in, gave a 60 per cent increase in yield. Millet following the digging in of elephant grass showed a 40 per cent increase in yield. Millet following Hyparrhenia grass gave a poorer response. The present development of resting experiments is with grass leys, undersown with legumes, to be grazed at intervals by cattle during the cycle of the experiment. It should be noted that at Ukiriguru the yield of millet following cotton in rotation is around 20 per cent greater than with continuous millet. Tie-ridging practised on the hill at Ukiriguru since 1940, undoubtedly has played a part in the better yields obtained. At Lubaga over a period of years tie-ridging on "ibushi" and "ibambasi" has given striking results over the prevalent cultivation, up to more than a doubling in yield. Manuring response on the black soils has been small; with a 5-ton dressing often only around a 5-10 per cent increase is obtained, with 25 per cent as a peak increase. Red soil results are more akin to those at Ukiriguru. District plot results support these findings.

In the cotton trials the two strains in cultivation in the Province, "Local", succeeded by Mz.561 have insufficient jassid resistance. It has been shown that in some years a high degree of jassid resistance is essential. Cotton breeding work and the trials, both at Lubaga and at Ukiriguru, have been directed largely to this end. It is now seen to be necessary to have a fair degree of Blackarm, *B. malvacearum*, resistance in any strain for the Province. The increases in yield over "Local" and Mz.561 are higher in the south of the Province, where the effective season, for various reasons, is shorter. At Lubaga, strains have given up to a 60 per cent greater yield of lint than the control, Mz.561. At Ukiriguru, on the hill, increases have been lower. But on the Ukiriguru "flats" a strain in one trial out-yielded Mz.561 by 100 per cent. Larger increases would be expected in general cultivation, where jassid attack has greater play than at Ukiriguru; the

growing of much resistant material on the stations makes effective jassid bombardment more difficult. From Ukiriguru and Lubaga a range of district plots supports the information being obtained from the stations. At Lubaga effective work on the poisoning stainers has been done.

At Ilonga in the Eastern Province the fertility approach to the problems of the area have barely been touched. The first approach is throughout grass stripping and resting. The main work at Ilonga, and the satellite district plots, has been the obtaining of some assessment of the loss caused to cotton by various insect pests—Stainers, American Bollworm, Lygus, Helopeltis and Pink Bollworm. Work has started in testing the response of different plant types to pest attack. A very free-cropping type, in spite of pest attack, allows of an appreciably heavier final crop. There will be two main avenues of approach; by increased knowledge trying to dodge some of the insect pest damage, and by obtaining a satisfactory strain which will markedly outyield "Local".

At Ukiriguru and Lubaga there has been work on early maturing sorghums for the area, and on pulses, other grains and roots. Plots heavily infested with *Striga hermonthica* have given nil sorghum yields; clean weeded plots have given reasonable yields in spite of striga infestation. Bulrush millet is little susceptible to striga damage, and year after year has given reasonably good crops on the Ukiriguru "mbuga".

In regard to rice, given adequate water supply, Mwabagole results have shown that, by selection, a substantial increase in paddy crop can be obtained over the seed stocks at present in general cultivation. Other strain characters are being considered. When adequate water is available, the trampling in of green material showed a marked benefit.

Each year chick pea has done well at Mwabagole. The local strain has out-yielded imported Indian strains.

The reports of the Ukiriguru, Lubaga and Ilonga Experiment Stations are published in the *Empire Cotton Growing Review*.

Development Centres, Central Province.—Experimental work during 1940-1942 was confined to observation plots of local and introduced varieties of food crops, planted on Native Administration Farms at Dodoma, Singida and Kondoa. In 1943 formal experiments were started at Dodoma, while half of the Singida farm was put under grass strip, alternative husbandry, to test the efficiency of this method of maintaining fertility, as compared with the use of farmyard manure on the other half of the farm, which has remained in continuous cultivation. The experiment programme at the Dodoma farm included the following trials which were repeated each year from 1943 to 1945:—

(1) A cultivation trial in which various indigenous systems of cultivation were compared.

(2) A cultivation and method of planting trial, in which various adaptations of indigenous methods of cultivation and planting practice were tested.

(3) A manurial trial, in which the effect of different rates and methods of applying kraal manure was tested.

(4) A spacing trial with bulrush millet.

(5) Variety trials of both long and short term sorghums, some of which were of local origin and some were introduced.

Late in 1945 trials were undertaken to compare the cost and efficiency of clearing both heavy and light thorn bush by hand, by bulldozer and by a combination of the two methods. The trials were sited at Msalatu and Makutapora, at mile 6 and mile 16 respectively on the Dodoma-Arusha Road, in Dodoma District. An approximate figure for the cost of each method was obtained, but it will not be possible to assess the efficiency of each system until time shows what effect each has on the subsequent regeneration of bush.

Nyamahona Development Centre and other plots, Lake Province.—Experimental work has either been centred at Nyamahona in Uzinza or has been undertaken by officers in their own districts. At Nyamahona the initial multiplication of the cotton strains 457 and 561 was undertaken. Also observations were made on the carrying capacity of grazing, where the surprising carrying capacity under rotational grazing of one and a half beasts per acre was recorded. Observations on the amount of farmyard manure procurable from bedding with Elephant Grass and field residues showed that between 1¼ and 2 tons can be obtained per beast. In Shinyanga, "good and bad farmers" plots were established at Chiefs' headquarters, as a form of demonstration of the effect of failure to manure, to tie-ridge and to uproot striga. Another interesting piece of work in Shinyanga is the series of natural regeneration plots on fenced and grazed land on the different soil types. Careful records are kept of the changes in the composition of the vegetation. Of greatest importance are the series of surveys of acreage under cultivation by the average homestead. These have been conducted in the past three years by the random sampling method of Mr. Allnutt. The results obtained are proving of the greatest value in preparing plans for rehabilitation and land utilization. The last survey covered the whole of Sukuma and provided, among other things, figures for average acreage for different crops per homestead and percentage of different soil types cultivated, for the different chiefdom and districts. In addition to the results of rice strain and variety experiments at Mwabagole corroborative evidence was required of the superiority in yield of "Kahogo" to "Afaa". This was undertaken by means of yield quadrats in 1945 and variety trials in various parts of the districts in 1945-1946. Considerable value has been derived from the district plots run by Ukiriguru and Lubaga for the purpose of testing cotton strains, both in terms of demonstration of good farming methods on grains and cotton and of the comparative value of the new methods as against the old.

Morogoro Experimental Station.—An improved strain of Katumbili maize was developed from selections made in 1940-1942 by the Temporary Agricultural Officer, Empire Cotton Growing Corporation, at Kingolwira, and selections form this strain are grown annually at Morogoro. In addition, bulk selections from short term yellow flint introductions, "Ekstein" and "Durum" are also grown for seed distribution to local natives.

Since 1943, trials of short term sorghum from Uganda have been carried out. Results appear to depend very largely on the type of season encountered. Multiplication and free distribution of the "Caroline Lee" sweet potato, a yellow-fleshed variety, has taken place on an extensive scale during the past three seasons. This variety has also been popularised in Bagamoyo District, due to its flavour rather than an appreciation of its higher dietetic value. A variety of cassava, called "Dihanga", was introduced in 1944 from Bagamoyo District, where its extension had been fostered by the District Commissioner. This variety has shown a high degree of resistance to

"mosaic" and has the added advantages of early maturity (six to seven months), good yield, good flavour, and low fibre content when ground for flour. Multiplication and distribution is being confined to this variety, pending the results of trials of a number of improved strains from Amani. Considerable quantities of seed of two local types of cowpea, "Chora" and "Bawa la Nzige", have been distributed during the period under review.

There is a constant demand for budded citrus plants from the Morogoro farm, a demand which frequently exceeds the supply. The average sales are in the vicinity of 6,000 citrus plants annually, in addition to an assortment of tropical fruits and flowering plants. Except for the latter part of the period 1940-1945, shortage of staff and the urgency of war production needs combined to make it impossible to carry out any elaborate experimental work at Morogoro Station. The farm has, however, been a constant source of supply of seed to local natives in particular and of fruit trees to all classes of the community throughout the Territory.

Northern Province Wheat Scheme Experimental Plots.—Wheat trials in connection with the Northern Province Wheat Scheme have been carried out since the inception of the Scheme in 1943. On black clay soils on the Ardhai Block the tests revealed that in both wet and dry years the earliest plantings gave the best yields. In seeding rates, yields from rates ranging from 60 lb. to 120 lb. showed no significant differences and the yields from sowings of as low as 45 lb. per acre were only just below the higher rates. Several new varieties supplied by the Senior Plant Breeder, Njoro, Kenya Colony were tried, using K.G. and 192 as controls. The types under trial were mainly the products of two crosses, and two strains of one of these show promise, both in yield and resistance to yellow rust and the forms of stem rust that have so far appeared in the area. In cultivation trials it was shown that double deep cultivation depressed yields, while after-cultivation, consisting of rolling and peg-tooth harrowing, tended to puddle the soil, so that neither of these treatments can be recommended. In tests of ploughing in stubble, as against burning it, the former treatment was significantly advantageous. In the manurial trials sulphate of ammonia applications, both before sowing and at the time of germination showed no effect on yield. In 1945 all plots that had green manure turned under whether sunflower, sunn hemp or buckwheat, showed depressed yields. The year was a dry one.

Trials on the red loam soils of the Ngare-Nairobi indicate that the moderately rust resistant crosses of 117A with Australian hybrids are the most promising and that the bearded hybrids shatter rather badly. Kenya Governor remains superior to both Reward and Australian types and both the latter are more susceptible to stem rust. Trials in the chocolate loam soils of the Mbulumbulu block show several promising varieties in testing against Kenya Governor and 192. One variety, 261, a bearded hybrid, yielded at 15 bags per acre in one experiment and at 12½ bags on a multiplication plot of one and a half acres.

Onion Experimental Plots, Northern Province.—An onion "time of planting" trial was conducted at Mbulu in 1943, with the object of ascertaining the optimum time of year for planting bulbs for seed purposes. The trials were observational only and, although negative results were obtained, they indicated that planting should be carried out, under Mbulu conditions, prior to the month of June. Simple observation trials were carried out at Moshi in 1943, with a view to ascertaining whether the planting and cultivation methods

as practised in Bermuda, Cyprus and India were superior to the local Chagga system of close planting and cultivation on the flat, and secondly, to observe the results of Sulphate of Ammonia applied at varying rates. The Chagga method was found to give the highest average yield, while striking results were obtained in all cases from a top-dressing of 2 cwt. of Sulphate of Ammonia applied dry at the end of the rains. The 1943 Moshi trials were elaborated in 1945, when three experiments, on methods of cultivation, on spacing and on nitrogenous manuring were conducted. The main conclusions drawn from these experiments may be summarized as follows:—

(a) The Chagga method of cultivation on flat beds gave higher yields than any other method tried, yielding 6·58 tons of onions per acre under the conditions of the experiment.

(b) The Chagga custom of spacing their onions very close together gave the highest yields per acre, but reduced the size of the onions from 9 to the lb. at wide spacing to 10·40 to the lb. at the closest spacing of four and a half inches, yields being 6·42 and 9·79 tons respectively under the conditions of the experiment.

(c) The application of Shs. 37/- worth (2 cwt.) of Sulphate of Ammonia per acre raised the value of the crop by Shs. 302/50 at Shs. 3/- per frasila. Yields, using Sulphate of Ammonia, were 10·11 tons per acre and without 5·27 tons per acre, showing an increase of 4·84 tons per acre.

Experimental Plots, Southern Highlands Province.—The Iheme Experimental Station, Iringa, was turned over to pig production during the war. All pigs from enemy estates, whose owners had been interned, were concentrated at Iheme and bred, their progeny being turned into bacon at the Ulete bacon factory nearby throughout the war years. During 1945 at the war's end, this unit was closed down and the pigs sold to private enterprises. The farm has now been virtually closed as an experimental station and is on a maintenance basis. The plot for coffee trials at Mbosi in Mbeya District, under the direction of the Chief Scientific Officer, Lyamungu, was continued. Two varieties of those under trial show promise. Demonstration plots were continued at Tukuyu and near Kyela in the Rungwe District, where various nuts, cinchona, oil palm, coffee and other crops are under trial and observation. Nicotine tobacco, *Nicotiana rustica*, is under trial and potato spraying tests are being demonstrated in Mbeya. Variety trials with flue-cured tobacco, which ceased at the outbreak of war, are now being commenced once again on selected farms in Iringa. Observation plots of flax were commenced in Mbeya, where a small crop was grown with encouraging results. Cultivation and manurial trials are being carried out on mixed farming principles at Nguruhe, Dabaga, where a new experimental station is projected.

The Mahiwa Rice Station, Southern Province.—This station was commenced in 1944 as a rice trial plot and in 1945 flood plots were laid out for experimental work. Cheap buildings were erected to facilitate the work and irrigation furrows were surveyed and completed. To date variety and distance trials have been commenced to determine improvements in native cultivation of rice in order to increase production because the supply of rice to the Zanzibar market is possible from the Southern Province which is so conveniently situated for shipping. Citrus trees were planted on the station in 1944. Propagation of seedlings was carried out for natives and other fruit trees and flowering shrubs for propagation were established.

The Luhira Tobacco Plot, Songea, Southern Province.—The old Mitawa plot was closed in 1940 and the new plot at Luhira, nearer the township of Songea and easier for supervision, was commenced in 1941. This has since been extended and beans, maize and other crops are multiplied and observed, and tobacco seed is produced for the Songea native crop.

Tanga Province Plots.—Except for the Sisal Experiment Station, there are no experimental stations in the Tanga Province. Observation plots are, however, maintained at Tanga (coconuts), Lushoto (European potatoes, sweet potatoes and pasture grass) and Tema in the Northern Usambara (wheat and vegetable seed). In Tanga, yield recordings of 500 selected coconut palms have been made since early 1941, the mean annual yield per tree over the five year period being 58 nuts, with extremes of 0 and 130. Over 1,500 seeds, the progeny of 43 palms, whose mean annual yield exceeds 80 nuts per palm, have been planted in nurseries. Observations on some twenty-five varieties of local and imported European potatoes have been in progress at Lushoto since 1943, with a view to selection for blight resistance, *Phytophthora infestans*. Only one local strain of Skerry Blue has displayed any marked degree of resistance, but even this is liable to succumb to the disease under weather conditions really favourable to blight. The variety 914 has proved to be immune to the disease during two growing seasons and has produced heavy yields under local conditions. This variety is now in process of being multiplied and, given reasonable conditions, there should be close on ten tons of seed available for distribution in the middle of 1947.

Observation plots of sweet potatoes and creeping grasses (local and exotic) were laid down at Lushoto in 1945, the former with a view to selecting and propagating the most useful of the many local varieties and the latter to discover species of grasses which might serve in establishing a rapid cover on eroded soils. Trials with European vegetables during the years 1941 to 1945 have shown that seed of all the common varieties, except Brussels Sprout and Borecole, can be easily and successfully raised in the cold dry areas in the north-west of the Usambara mountains. Practical use was not, however, made of this fact, as sufficient supplies of the common vegetable seeds become available from other sources. A severe attack of Yellow Rust in wheat, *Puccinia glumarum*, in the Usambaras in 1943 led to the introduction of the two resistant varieties 117A and Sabanero, but continued observation has provided little information, as the disease has not reappeared in any of the local varieties (Simpson's, Rongai and L.3, 192, 117A and Sabanero).

Mwanhala and Tumbi Development Centres, Western Province.—At Mwanhala from 1940 to 1944 manurial experiments consisted of a series to test the effect of manurial dressings on maize, millets and cassava, and a series to test the effect of different types of manures and treatments on the same crops. The results from the series showed considerable increases in yields in lb. per acre, from manurial dressings up to 6 tons per acre. The results from the second series showed the superiority of Kraal manure spread and the superiority of tie-ridging when compared with flat cultivation or ridges untied. The fallow experiments were carried out to test the effect on a crop of maize after two years fallow and to test the effect on a crop of maize after two years resting crops. No significant results were obtained, but there were indications that pigeon pea and grass fallow were superior to all other treatments.

During 1945 action was taken to reorganize the station prior to the planning of a new programme of experimental work. A new series of fallow experiments were started in 1945, to make further investigations on grass fallows and resting crops as well as a manurial experiment with phosphate. The acreage under cultivation at Mwanhala was increased to include a block of disease free cassava from two good varieties, to provide cuttings for distribution to the various chiefdoms and 12 acres under paddy, which was made possible by extending the dam. Owing to losses in livestock through Trypanosomiasis some bush clearing was carried out and preparations were made to lay out grazing paddocks to practise and demonstrate rotational and controlled grazing.

Selected seed was sold for planting purposes and a start was made in nursery work in 1945 to meet the demand for planting material other than farm crop seeds. A new cattle shed and a seed store were built at Mwanhala and work on building a new house for the Agricultural Assistant in charge was in progress in 1945.

At Tumbi most of the manurial and fallow experiments planned for Mwanhala were duplicated, to determine from the results if any particular action requires to be adopted for the soils of the Tabora District. The results from the manurial experiments were practically similar to those at Mwanhala. During 1945 approximately 57 acres were under cultivation for the production of seed for sale in Tabora District. This development centre was also reorganized in 1945 and served for demonstrating the importance of manuring, compost making, contour farming, tie-ridging and use of agricultural implements. Other experimental work in the Western Province was a series of small Haricot bean observation plots in Kasulu District to test the "Cambridge Countess" variety with the following varieties of white haricot beans: Burka, Moro, Sucer pearl, Robust, Kabengwa.

TRAINING OF AGRICULTURAL INSTRUCTORS

Ukiriguru Agricultural Training Centre.—An Instructors' training school was established in 1938 with the support of the Native Treasuries of Mwanza, Kwimba, Maswa and a small departmental contribution. In 1939 the first pupils entered the school for training as Agricultural Instructors. The numbers which have passed through the school since its inception up to the end of 1943 have been as follows:—

Year	Nos. Passed out	Allocated to: Native Authority Province	Department Lake Province	Department Other Provinces
1940	14	11	3	—
1941	9	4	5	—
1942	15	13	2	—
1943	29	12	2	15
1944	23	15	4	4
1945	25	7	2	16
	115	62	18	35

Until 1942 pupils were only employed by the Lake Province Native Treasuries and by the Department in the Lake Province. Since then twenty-six men have been trained for other provinces in the Territory. An Agricultural Assistant undertook the work of Headmaster but now the school is run by

a newly-appointed Education Officer seconded to this work. A great difficulty has been the shortage of suitable African teachers, as none were available who were trained in agriculture. They have come and gone but now a fairly good staff has been built up numbering seven in all, of whom five are ex-Ukiriguru students.

The basic idea in training the men is to give them a proper agricultural understanding of the problems and methods of approach to the people regarding these problems. They are taken on tours to other districts and do safaris through Mwanza District. They get practice at addressing gatherings both inside the school and out, and also methods of propaganda. They receive a good knowledge of arithmetic and botany in addition to the applied subjects which they would naturally be taught at a school for instructors. Every lecture on a subject which has a practical aspect is followed by a period of explanation in the field. Classes do not now exceed twenty in number, and to avoid the holding back of the teaching of the higher standard students, classes are divided up on the basis of intelligence and standard of education. Mathematics sets have also been instituted. The standard of mathematics is generally poor, and needs much attention.

At first the course extended to sixteen months, now it is of two years' duration. It includes a three-months' pre-term course to prepare the men for the main course by putting them through some elementary work and the weeding out of any obviously unsuitable candidates is then arranged. There are three other terms with a month's holiday after the first term.

Plans are now in being for new buildings to accommodate 120 students who will undergo a course of two years. At the moment the buildings are quite inadequate.

COUNCILS, BOARDS AND COMMITTEES

The Director of Agriculture and of Agricultural Production is also Sisal Controller, and, apart from being a member of the Executive Council and of the Legislative Council, he is Chairman of the Sisal Board, the Tea Board, the Coffee Board and the Cotton Board. He is a member of the Economic Control Board, the Railways and Ports Council, the Labour Board and the Editorial Board of the East African Agricultural Journal.

PUBLICATIONS, 1939 TO 1945

I.—Departmental Pamphlets

Pamphlet No.

26. The Sisal Experimental Station Annual Report, 1939.
27. Sixth Annual Report of Coffee Research and Experimental Station, Lyamungu, Moshi, 1939.
28. Seventh Annual Report of Coffee Research and Experimental Station, Lyamungu, Moshi, 1940.
29. Insects Injurious to Cotton in Tanganyika Territory.
30. A Record of Investigations and Conservations on the Agriculture of the Cultivation Steppe of Sukuma and Nyamwezi with suggestions as to the lines of progress.
31. Mambo ya Ukulima. (Swahili Version).
32. Memorandum on the Desert Locust.
33. The Collection and Commercial Preparation of Ceara Rubber (Manihot Glaziovii).

34. Eighth Annual Report of Coffee Research and Experimental Station, Lyamungu, Moshi, 1941.
35. Ninth Annual Report of Coffee Research and Experimental Station, Lyamungu, Moshi, 1942.
36. Tenth Annual Report of Coffee Research and Experimental Station, Lyamungu, Moshi, 1943.
37. Coffee Crop, 1943-1944 : Report on Quality and its Improvement.
38. Cultivation and Diseases of Wheat.
39. The Multiple Stem System of Growing Coffea Arabica.
40. Utunzaji wa Kahawa Mafundisho ya Kutunza Mibuni iwe na Mashina matatu.
41. Agriculture in Tanganyika.
42. Eleventh Annual Report of Coffee Research and Experimental Station. Lyamungu, Moshi, 1944.
43. Mulching of Coffea Arabica.

II.—Departmental Leaflets

Leaflet No.

13. Kulima Vitunguu.
14. Onion Cultivation.

III.—Entomological Leaflets

18. Collected Recipes for Insecticides.
19. Mineral Dust in Grain Storage.

IV.—Entomological Circulars

9. Pyrethrum as Insecticide.
10. Kukusanya Hariri za Mwitu.
11. Bean Weevils.

V.—Mycological Leaflets

17. Diseases of Potato.

VI.—Revised Publications

Pamphlet No. 18. Flue-cured Tobacco (Revised 1941).
Leaflet No. 5. Coconut and Copra (Revised 1945).
Leaflet No. 11. Notes on Pyrethrum (Revised 1940).

VII.—Miscellaneous Publications

Annual Report of Department of Agriculture, Tanganyika Territory, 1939.
Annual Report of Department of Agriculture, Tanganyika Territory, 1940.
Annual Report of Department of Agriculture, Tanganyika Territory, 1941.
Annual Report of Department of Agriculture, Tanganyika Territory, 1942.
Annual Report of Department of Agriculture, Tanganyika Territory, 1943.
Annual Report of Department of Agriculture, Tanganyika Territory, 1944.
Annual Report of the Sisal Experimental Station, 1944.
Proceedings of Departmental Conference held by Lyamungu, Moshi.
Specialist and Research Work of Department of Agriculture, Tanganyika Territory, 1943.
Habari za Wadudu wa Pamba.
Cotton Price Reckoner.

VIII.—Articles in the "East African Agricultural Journal" by Officers of the Agricultural Department

Issue		
January,	1939:	"Selection within Coffea Arabica in Tanganyika Territory," by S. M. Gilbert.
January,	1939:	"Plant Diseases Spread by Bugs," by G. B. Wallace.
March,	1939:	"Non-Parasite Disease of Arabica Coffea," by G. B. Wallace.
March,	1939:	"Eleusine Cultivation by Wachagga on Kilimanjaro," by J. R. Curry.
March,	1939:	"Vernonia Subuligera as a Green Manure," by R. J. M. Swynnerton.
March,	1939:	"Some Production Cost Figures for Native Crops in the Eastern Province of Tanganyika Territory," by N. R. Fuggles-Couchman.
March,	1939:	"The Ridge in Native Cultivation with Special Reference to Mwanza District," by N. V. Rounce and D. Thornton.
May,	1939:	"Settled Holdings in the Tropics: A Comparative Review," by N. R. Fuggles-Couchman.
July,	1939:	"Leguminous Crops in Native Agricultural Practice," by D. Sturdy.
July,	1939:	"The Unsuitability of Certain Virgin Soils to the Growth of Grain Crops," by N. V. Rounce.
July,	1939:	"Notes on Construction of a Simple home-made Level," by A. H. Savile.
September,	1939:	"The Control of the Coffee Berry Borer in Bukoba," by T. S. Jervis.
September,	1939:	"Control of Smut Diseases—A Review of Recent Literature," by G. B. Wallace.
November,	1939:	"French Bean Diseases and Bean Fly in East Africa," by G. B. Wallace.
November,	1939:	"Notes on Fencing," by B. R. D. Eccles.
November,	1939:	"Green Manurial and Cultivation Trials made at Morogoro, Eastern Province, Tanganyika Territory," by N. R. Fuggles-Couchman.
November,	1939:	"Notes on the use of the Striding Level when Laying out Contour Banks," by A. H. Savile.
January,	1940:	"Some Further Observations on Coffee Thrips," by F. B. Notley.
January,	1940:	"Ox Pack Transport in Sukumaland, Tanganyika Territory," by J. G. M. King.
January,	1940:	"Utilization of Sisal Waste," by G. W. Lock.
March,	1940:	"Rooting of Softwood Cuttings of Coffea Arabica," by L. M. Fernie.
March,	1940:	"An Ingenious Native Chicken House," by C. G. Glegg.
March,	1940:	"Notes on Food Storage," by W. V. Harris.
May,	1940:	"Notes on Planting and Maintenance of Citrus Trees," by J. C. Eyre.

July,	1940:	"Native Honey Production for Export," by W. V. Harris.
July,	1940:	"The Possibilities of Vegetative Propagation of Coffee in Tanganyika," by R. B. Allnut.
July,	1940:	"The Locust Tracheal Mite," by W. V. Harris.
October,	1940:	"Termites in East Africa—General Biology," by W. V. Harris.
January,	1941:	"Native Methods of Food Storage in Tanganyika," by W. V. Harris.
April,	1941:	"Mixed or Multiple Cropping in Native Agricultural Practice," by J. K. Robertson.
April,	1941:	"Antestia in Northern Province of Tanganyika," by F. B. Notley.
April,	1941:	"Beeswax," by W. V. Harris.
April,	1941:	"Termites in East Africa: Field Key and Distribution (by Territories)," by W. V. Harris.
October,	1941:	"Mylabris Beetles," by W. V. Harris.
October,	1941:	"Protection of Native Plantations against Wild Pigs," by J. K. Robertson.
October,	1942:	"Rice Growing in Dry Areas," by R. B. Allnut.
October,	1942:	"Method of Storing Sweet Potatoes," by R. B. Allnut.
January,	1943:	"Termites in East Africa—Termites and Buildings," by W. V. Harris.
January,	1943:	"Improved Trek Chains," by B. R. D. Eccles.
January,	1943:	"Sisal Rope Trek Chains," by J. E. Peat.
April,	1943:	"Maize Storage," by W. V. Harris.
January,	1944:	"Collected Recipes for Insecticides," by W. V. Harris.
January,	1944:	"Cultivation of Papaw and Production of Papain," by F. R. Sanders and J. K. Robertson.
January,	1944:	"Diseases of Papaw," by G. B. Wallace.
January,	1944:	"Sclerotinia Disease of Beans and Other Crops," by Mrs. Maud M. Wallace.
April,	1944:	"Wanyakyusa Agriculture," by D. H. Thwaites.
April,	1944:	"Large-scale Wheat Production at Oldeani," by N. R. Fuggles-Couchman.
July,	1944:	"Agriculture in Matengo Highlands," by A. S. Stenhouse.
July,	1944:	"Army Worm," by W. V. Harris.
July,	1944:	"Cassava," by R. B. Allnut.
July,	1944:	"An Inexpensive Farm Gate," by J. K. Robertson.
July,	1944:	"Supplement to the Revised List of Plant Diseases in Tanganyika Territory," by G. B. Wallace and Mrs. Maud M. Wallace.
October,	1944:	"Note on the Cost of Rooting Cuttings of Coffea Arabica," by S. M. Gilbert.
October,	1944:	"Collapsible Vegetable and Fruit Crate," by A. H. B. Childs.
January,	1945:	"History of a Herd at Coffee Research Station, Lyamungu, Moshi, 1935-44," by S. M. Gilbert.
January,	1945:	"Tomato Blight," by G. B. Wallace and Mrs. Maud M Wallace.

SECTION III.—FINANCE

The financial provision for the period 1st January to 31st December 1945, together with the actual expenditure, is given below. The last statement published was in the Annual Report of the Department for 1938, and it will be seen, if the figures be compared, that the scope of the Department has greatly increased.

The Empire Cotton Growing Corporation continued their recurrent grant which amounted to £4,500. In addition, four officers are paid and posted to this Territory for cotton investigation work. The salary of one Ginnery Inspector for the year, amounting to £600, was again provided by the British Cotton Growing Association. The financial assistance afforded by the councils of the above two bodies is greatly acknowledged.

Grants totalling £68,440 were made from the Agricultural Development Fund late in the year for the specific development works shown below.

The following are the items of direct revenue from fees and taxes in 1945, compared with the sums collected during the three previous years :—

	1942	1943	1944	1945
	£	£	£	£
Bukoba Coffee Grading Fees ...	2,260	2,280	2,940	2,260
Sisal Tax	22,270	17,990	27,410	65,120
Coffee Tax	3,570	5,150	7,340	6,820
Cotton Tax	3,940	3,660	3,340	4,030
Pyrethrum Tax	340	340	440	780
Tea Tax	660	730	470	680

The details of the provision and expenditure are given in the following table :—

	Provision for 1945	Expenditure for 1945
Personal Emoluments:	£	£
Administrative	14,930	13,240
Specialist Scientific Staff	4,990	3,590
Field and Experimental Staff	59,040	48,990
Total Personal Emoluments ...	£78,960	£65,820
Other Charges:		
Travelling (including Railway Fares and Freights, Travelling and Transport Allowances, Transport and Maintenance and Running of Motor Vehicles) ...	15,600	12,440
Upkeep of Experimental Stations and Plantations (including part Coffee Research Station), Contribution to Native Treasuries' Seed Farms and Minor Improvements to Agricultural Stations	16,160	13,730
Upkeep of Agricultural Training Centres	700	600
Upkeep of Ploughing Schools	100	80
Purchase of Planting Materials	250	30
Plant Sanitation	100	20
Purchase of Tools, Implements and Scientific Equipment	730	460
Expenditure on Cotton Tax Services	3,530	2,780
Agricultural Development, Special Services	250	160
Increased Food Production	5,000	3,220
Contribution to East African Agricultural Research Institute	4,500	6,000
Grant to Sisal Board	2,000	—
General Expenditure (including Bicycles, Books of Reference, Contingencies, Electricity, Stationery, Tents, Typewriters and Uniforms)	2,920	2,340
Total Other Charges ...	£51,840	£41,860

	Provisions for 1945 £	Expenditure for 1945 £
Special Expenditure:		
Contribution to Cost of Seed Specialist	400	20
Sisal Experimental Station, External Field Trials, Capital Expenditure	4,000	200
Maize Planting Grants	20,000	17,360
Purchase of Motor Vehicles	3,300	2,920
Improvement of Copra Industry	300	150
Water Supply, Ukiriguru	2,500	1,060
Bukoba Coffee Mulching	500	380
Citrus Industry, Grading and Inspection	200	140
Haricot Bean Production	2,000	840
Onion Nursery, Mbulu	1,050	710
Expansion of Pig Production, Iheme Agricultural Station	4,500	2,320
Equipment (including two Diesel Engines, two Maize Harvesters and Experimental Sisal Cutter)	1,000	—
Soil Trials, Southern Highlands Province, and Investigation of Parasite for Sisal Weevil	950	—
Total Special Expenditure	£40,700	£26,100
Grants from Agricultural Development Fund:		
(RECURRENT)		
Training of Agricultural Instructors	10,000	582
Agricultural Training for Indians	1,000	—
Development of Sukumaland	10,000	394
Development of Rice Production in Southern Province	1,170	—
(SPECIAL)		
Training of Agricultural Instructors	20,000	563
Agricultural Training for Indians	2,500	22
Development of Sukumaland	10,000	767
Acquisition of Land for Cotton Experiment Station, Ilonga	7,000	—
Trials of Airblast Saw Gin	70	70
Development of Rice Production in Southern Province	1,800	865
Acquisition of Land for Experimental Coffee Station, Bukoba District	3,900	—
Loan to Tanga Native Treasury, Marketing of Muheza Orange Crop	1,000	1,000
Total Grants from Agricultural Development Fund	£68,440	£4,263
GRAND TOTAL	£239,940	£138,043

It should be noted that of the total, a sum of no less than £16,070 is provided by reimbursements and cross entries making a net £121,973.

In addition to the provision made under the department's head, and under Agricultural Development Fund, the following provisions for services connected with "agriculture" were made in the Territorial estimates for 1945 :—

	Provision for 1945 £	Expenditure 1945 £
Anti-Locust Measures		36,140
Loans from Territory Funds :—		
Agricultural Crop Loans	£9,322	
Agricultural Machinery Loans	£3,758	
Subventions to :—		*13,080
Imperial Institute of Entomology		500
,, Institute of Mycology		250
,, Agricultural Bureaux		390
,, Institute		400
,, College of Tropical Agriculture, Trinidad		500
Coffee Section of the British Empire Producers' Organization		155
International Locust Control Scheme		2,010
East African Agricultural Research Institute		6,030
†Grant to Sisal Board		49,350
†Grant to Coffee Board		5,710
†Grant to Pyrethrum Board		1,120
†Grant to Tea Board		1,050
Total		£116,685

*Actual expenditure.
†From the Sisal, Coffee, Pyrethrum and Tea Tax Funds.

SECTION IV.—LEGISLATIVE CHANGES AFFECTING AGRICULTURAL INDUSTRIES 1939 TO 1945

At the outbreak of war the Agricultural Department assumed charge of all food, with the Director as Food Controller under the Defence Regulations of the Emergency Powers (Defence) Act. Later, this arrangement was amended and the Economic Control Board was established, the Director being a member, and he assumed also the function and title of Director of Agricultural Production. During the war period all members of the Department performed multifarious duties under the Defence Regulations, largely in connection with control of food, prices, movement of produce and other economic control matters. Many of the controls are now gradually being lifted, though the export and import of most of the important commodities as well as control, largely of marketing, still continues. The Defence Regulations, dealing with the control of agriculture and of agricultural commodities are outside the scope of this report, and only important legislative changes affecting the basic agricultural legislation of the Territory are described.

Cotton.—An amendment of the Cotton Ordinance, No. 12 of 1937, was enacted in 1940, and it extends to the Deputy Director the powers of the Director. The amendment also extends the powers of the Director and his Deputy to require certain storage accommodation at pioneer buying posts; it limits the buyers at cotton markets, and regulates the packing of raw cotton. Amendments to the Cotton Rules of 1937 regulate the movement of cotton seed and further lay down a formula for the evaluation of the minimum price at which native cotton may be sold.

Coffee.—An amendment of the Coffee Industry (Registration and Improvement) Ordinance, No. 7 of 1936, was enacted in 1942, regulating the dealing in and removal of coffee, and establishing Provincial Coffee Licensing Boards to govern the licensing of coffee dealers. In 1945 an order, under the Native Coffee (Control and Marketing) Ordinance of 1937 was made, establishing an annual levy on all native parchment coffee sold by the Moshi Native Coffee Board, the amounts so collected to be administered by the Board for the benefit of the industry. An Ordinance to amend the Coffee Factories Ordinance of 1932 was enacted in 1942, clarifying terms, prescribing fees and further regulating the hulling and cleaning of coffee and of curing works or factories.

Coconuts.—In 1941 the Coconuts (Theft) Ordinance was enacted to protect the coconut industry. This placed the onus of proof on unauthorized persons in possession of nuts. It also conferred powers of arrest on owners of plantations under certain circumstances. In 1945 the Copra Ordinance was enacted. This Ordinance makes provision for the establishment of District Copra Boards to decide the periods during which coconuts may not be harvested and copra manufactured, to govern the manner in which copra shall be manufactured and stored, and to provide for control of the issue of copra dealers' licences, copra milling licences and copra exporting licences. It provides also for inspection of both premises and copra.

Pyrethrum.—The Pyrethrum Industry Ordinance was enacted in 1939 for the establishment of a Pyrethrum Board and a levy upon pyrethrum sold, in order to maintain a pyrethrum fund to be used exclusively for the benefit of the industry. The Ordinance also provides for marketing of pyrethrum through a single agency, and for rules to be made for packing, grading,

chemical testing, grinding, and generally for the better carrying out of the Ordinance. In 1941 and again in 1943 the Ordinance was amended to alter the constitution of the Board.

Sisal.—In 1939 Rules under the Sisal Industries Ordinance of 1938 were enacted, requiring registration of estates and particulars of acreage and age of plantings, and these were later amended in 1942 and again in 1945. In 1940 the Sisal Fibre (Cess) Order was enacted for the establishment of a sisal fund and this was amended in 1944. In 1942 an Ordinance was enacted to amend the Sisal Industry Ordinance of 1938 so as to vary the constitution of the Sisal Board, to enable future variations to be effected without recourse to amending legislation. In 1945 an Ordinance was enacted to consolidate and amend all the existing laws relating to sisal. The new Ordinance extends the powers of the Sisal Board to a considerable extent.

Sugar.—In 1939 the Sugar (Control) Ordinance, No. 19 of 1938, was brought into operation and later, in 1940, orders were issued governing the export quota.

Tea.—The Tea Ordinance of 1934 was amended in 1939, again in 1940 and also in 1943, on each occasion to extend the duration of the Ordinance and to increase the acreage permitted to be planted in the Territory by international agreement. Orders were issued from time to time as necessary on such matters as the cess and the Tea Board.

Tobacco.—In 1940 the Native Tobacco (Control and Marketing) Ordinance was enacted. This provides for the appointment of Boards to control native tobacco industries and for the marketing of native tobacco. The Ordinance was applied to the Songea District in 1941 and Board members have been appointed annually since then. Orders were issued for the establishment of a cess under the Ordinance and for marketing through a single agency.

In 1941 the Non-Native Tobacco Industry Ordinance was enacted. This makes similar provisions to those of the Native Tobacco Ordinance and these came into force in 1942 and were applied to the non-native industry in the Southern Highlands Province. In effect, this legislation has resulted in central grading and baling by an officer partly paid by Government in order to ensure the production of a standardized commodity.

Wheat.—In 1940 the Sale of Wheat Ordinance was enacted, establishing a Board with powers to advise the Governor to order marketing of wheat through a single agency and to make rules generally in regard to sales of wheat for the benefit of the industry. The Ordinance was amended in 1942 to ensure that representations of the Board were in fact the wishes of recognized Wheat Growers' Associations. The Ordinance was applied to the Northern Province.

Increased Production of Crops.—In 1944 the Increased Production of Crops Ordinance was enacted. This legalized District Production Committees to advise Government on increasing food production. It provided for guaranteed prices breaking grants for new land brought under food crops, and for minimum guaranteed returns. Further provision was made for orderly marketing of crops and for information to be supplied by farmers relative to their crops upon demand. Orders were issued under the Ordinance legalizing Production Committees in the important non-native farming areas.

Produce Export.—In 1943 an Ordinance to amend the Produce Export Ordinance of 1929 was enacted. This Ordinance provides for compulsory

registration of exporters of seed, dairy or meat products. It provides also for registration of premises where such products are stored or dealt with, and registration and permission to export may be withheld under certain conditions. The Ordinance has been largely used for the control of export of Seed Beans, to ensure standard quality.

The Plant Protection Ordinance.—Various rules were enacted as necessary under the Plant Protection Ordinance of 1937 for the better prevention of disease and insect pests in regard to cotton, coconuts, coffee, tobacco and other crops.

CONCLUSION

It is desired to express appreciation of the loyal service rendered by the staff throughout the war years. In spite of depletion in numbers, due to so many officers being absent serving with the Forces, those who had perforce to remain carried out not only their own duties and as many as possible of those of their absent colleagues, but in addition, the duties connected with the various controls and other multifarious matters occasioned by the war. Mr. D. Sturdy and Mr. G. W. Lock were each awarded the O.B.E. for their special service. The awarding of the C.M.G. to the Director is an honour not only for his own service but also for that of the staff of the Department.

Twenty-two officers of the Department served with the armed forces during the war. Although Mr. J. I. Thompson had his plane shot down in Burma and was missing for some months, he returned safely and we were able to welcome him and all the others back to the Department at the end of the war. Mr. H. L. Brett rose to the rank of Lieut.-Colonel, and amongst several others Mr. K. Johansen, the youngest member of the Department at that time, commanded a Company of the King's African Rifles. Mr. R. J. M. Swynnerton was awarded the M.C. in the East African campaign and from 1942 was Agricultural Officer in the team sent by the Secretary of State to make the island of Malta as self-supporting as possible.

The thanks of the Department are accorded to all the various members of the Boards and Committees that assist it in its work, and for the assistance given by all members of the Service in other departments, and especially of the Provincial Administration. The co-operation that exists with the Departments of Agriculture in the neighbouring territories and with the East African Agricultural Research Station, Amani, is becoming increasingly close, and the thanks of the Department are accorded to the various members of those departments for the generous help they have afforded.

R. W. R. Miller,
Director of Agricultural Production

LIST OF EUROPEAN STAFF AS ON THE 31st DECEMBER 1945

Director: R. W. R. Miller, C.M.G., B.A. (Cantab), Dip. (Agric.) (Cantab), Dar es Salaam.

Deputy Director: C. E. J. Biggs, B.Sc. (London), Dip. (Agric.) (Wye), Dar es Salaam.

Chief Scientific Officer: S. M. Gilbert, B.Sc. (Agric.), N.D.A., Lyamungu, Moshi.

Land Settlement Officer: R. M. Davies, B.Sc., B.Sc. (Agric.) (Aberd.), on leave.

Entomologists: W. V. Harris, M.Sc. (Dunelm), A.I.C.T.A., F.R.E.S., F.Z.S., Morogoro; *F. B. Notley, M.Sc., A.I.C.T.A., Lyamungu, Moshi.

Plant Pathologist: G. B. Wallace, B.Sc., Ph.D. (Edin.), on leave.

Chemist: H. B. Stent, M.Sc. (Tech.) (Vict.), A.I.C., A.I.C.T.A., Lyamungu, Moshi.

Senior Agricultural Officers: D. Sturdy, O.B.E., M.A. (Agric.) (Cantab), seconded to Jamaica; H. P. Smart, B.Sc. (Agric.) (South Africa), A.I.C.T.A., Dar es Salaam; C. J. McGregor, C.D.A., on leave; G. W. Lock, O.B.E., N.D.A., N.D.D., Ngomeni, Tanga; J. V. R. Brown, B.Sc. (Agric.), Moshi; *A. H. Savile, C.D.A. A.I.C.T.A., on leave; N. V. Rounce, C.D.A., A.I.C.T.A., Mwanza; A. S. Stenhouse, B.Sc., B.Sc. (Agric.) (Aberd.), N.D.A., Lindi; R. D. Linton, B.Sc. (Agric.) (Belfast), A.I.C.T.A., Lushoto; *A. Pitcairn, Dip. Agric. (Edin.), Tabora; F. R. Sanders, B.A. (Hons.) (Cantab), C.D.A., on leave; R. B. Allnut, B.Sc. Agric. (London), Dodoma.

Agricultural Officers: H. Marsland, B.Sc. (Edin.), N.D.A., N.D.D., Shinyanga; T. C. Cairns, B.Sc. (Edin.), Arusha; J. K. Robertson, B.Sc. (Agric.) (Aberd.), A.I.C.T.A., Lyamungu, Moshi; F. W. Thomas, C.D.A. and C.D.F. (Glas.), Bukoba; J. R. Curry, N.D.A., seconded to Bahamas; *N. R. Fuggles-Couchman, B.Sc. (Lond.), C.D.A. (Cantab), A.I.C.T.A., Arusha; D. Thornton, B.Sc., on leave; J. M. G. King, C.D.A. (Wye), A.I.C.T.A., Iringa; J. C. Eyre, B.Sc. (Agric.) (Stell.), D.I.C., seconded to Palestine; H. Gillman, M.Sc., A.I.C.T.A., on leave; T. H. Marshall, Cert. Kew, F.R.H.S., Mbeya; *R. J. M. Swynnerton, M.C., B.A., Dip. Agric. (Cantab), A.I.C.T.A., Moshi; C. J. M. Krige, B.Sc. (Agric.) (Stell.), Morogoro; *C. Mansfield, Dip. Agric. (Wye.); *M. Lunan, B.Sc., A.I.C.T.A., Mwanza; J. T. Purvis, B.Sc. (Agric.), Musoma; T. S. Jervis, Bukoba; R. W. Collett, Songea; H. Doggett, B.A. (Cantab), A.I.C.T.A., Tanga; *H. L. Brett, Mbulu; F. E. Luscombe, B.Sc. (Agric.), A.I.C.T.A., Lindi; E. T. Ward, C.D.A., Dodoma; *A. H. B. Childs, M.R.A.C., Q.A.L.A.S., Iringa; J. D. Hunter-Smith, B.Sc. (Agric.), Morogoro; *C. G. Glegg, Dip. Hort. (Wye), Mwanza;

*Served with the Forces during the war 1939-1945.

C. M. H. Sutherland, B.Sc. (Aberd.), B.Sc. (Agric.) (Aberd.), Mahenge. One vacancy.

Tobacco Officer: J. H. McGregor, Iringa.

Agricultural Officer (Ginnery): R. I. Butler, on leave.

Senior Agricultural Assistants: W. C. Clarke, seconded to Montserrat; G. S. Brown, Singida; L. Leslie-Moore, Kilwa; W. Sibly Warne, F.R.H.S., Songea; A. A. E. Weirich, Bagamoyo.

Agricultural Assistants: A. Taylor, Morogoro; R. Seager, Kasulu; B. R. D. Eccles, Tukuyu; R. B. Silcock, Kilosa; D. Shepstone, on leave; *C. E. Allen, Dodoma; *Pienaar, Ngomeni; B. E. M. Petit, on leave; V. Allen, Mwanhala, Nzega; *J. C. van Schoor, Morogoro; *G. H. Attwell, B.Sc., Ukiriguru; D. R. A. Goode, Biharamulo; *K. Johansen, on leave; *A. M. Pienaar, Ukiriguru Fela; M. L. Reiner, Kondoa-Irangi; J. M. van Dyk, Morogoro; A. W. Boot, Lyamungu; *T. W. H. Dore, Kilwa; T. J. Taverner, Lushoto; K. B. Louwrens, Iringa; *J. I. Thomson, Kilosa. Ten vacancies.

Field Assistant: H. J. P. Nelson, Tabora.

Temporary Scientific Assistant: Mrs. M. Wallace, on leave.

Office Superintendent: *D. F. T. Brown, seconded to Mauritius.

Sisal Control

Deputy Sisal Controller: *H. M. Watkins, Dip. Agric. (Cedara), on leave.

Advisory Engineer: E. M. Shirtliff, Tanga.

Sisal Inspectors: H. A. B. Fowler, Kingolwira; J. H. Walker, Tanga; J. V. Gray, Lindi.

Stenographers: Miss C. P. Thiel, Tanga; Miss J. L. R. Wilson, Dar es Salaam.

District Production Committees

Executive Officers: *W. E. H. Scupham, C.M.G., M.C., Iringa; H. E. Emson, Moshi.

*Served with the Forces during the war 1939-1945.

LIST OF PUBLIC GINNERIES LICENSED IN 1945

Province and District	Locality	Number of Gins		Licensees
		Saw	Roller	
Eastern:				
Uzaramo	Pugu	—	6	Pugu Industrial Company.
Morogoro	Morogoro ...	—	22	Tanganyika Cotton Co., Ltd.
,, ...	Mikesse ...	—	20	East African Cotton Co., Ltd.
,, ...	Ngerengere ...	—	11	Liverpool Uganda Co., Ltd.
,, ...	Duthumi ...	—	20	Tanganyika Cotton Co., Ltd.
,, ...	Turiani	—	16	do.
Kilosa	Kilosa	—	18	Juma Haji.
,, ...	Rudewa ...	—	22	Tanganyika Cotton Co., Ltd.
,, ...	Msowero ...	—	16	Msowero Ginnery, Ltd.
Bagamoyo	Mandera ...	—	20	Liverpool Uganda Co., Ltd.
Rufiji	Kilimani ...	—	12	East African Cotton Co., Ltd.
,, ...	Msomeni ...	—	15	do.
,, ...	Logeloge ...	—	12	do.
Ulanga	Kiberege ...	—	12	Vithaldas Haridas and Co., Ltd.
,, ...	Malinyi ...	—	12	do.
Southern:				
Lindi	Mtua	—	14	Kikanda Cotton Trading Co., Ltd.
Kilwa	Kikanda ...	—	10	do.
Tunduru	Tunduru ...	—	14	do.
Mikindani	Mikindani ...	—	4	Mikindani Cotton Co., Ltd.
Tanga:				
Korogwe	Korogwe ...	—	25	Moshi Trading Co., Ltd.
,, ...	Sindeni	—	11	do.
Northern:				
Moshi	Moshi	—	24	do.
Mbulu	Idulu	—	12	Jamal Ramji and Co., Ltd.
Lake:				
Mwanza	Mwanza ...	—	25	Nakasero Commercial Corp., Ltd.
,, ...	Murutunguru ...	1	24	Ladha Meghjee and Sons, Ltd.
,, ...	Ihale	—	14	Mwanza Cotton Trading Co., Ltd.
,, ...	Bukumbi ...	—	15	Bhagwanji Sunderji and Co.
,, ...	Nassa	—	20	Sikh Ginners.
,, ...	Buchosa ...	—	14	Vithaldas Haridas and Co., Ltd.
Kwimba	Pambani ...	—	17	Pambani Limited.
,, ...	Nyambiti ...	—	20	Lake Province Cotton Co., Ltd.
Musoma	Mugango ...	—	20	do.
Maswa	Malampaka ...	—	12	Bhagwanji Sunderji and Co.
,, ...	Luguru ...	—	14	do.
Shinyanga	Usogore... ...	—	14	do.

Appendix 3

COTTON STATISTICS: SEASON 1945

(*By Districts*)

Districts	No. of Growers	Quantity of seed distributed in tons	Quantity of seed-cotton marketed			Approximated total cash revenue to native in Shs.
			1st Grade tons	3rd Grade tons	Total tons	
Lake Province:						
Musoma...	9,677	202	1,176·19	161·16	1,337·45	340,624·00
Mwanza...	60,500	2,000	11,095·27	423·35	11,518·62	3,136,288·00
Kwimba...	30,000	500	3,636·57	243·49	3,880·06	1,034,724·00
Maswa ...	35,000	732	3,674·44	268·55	3,942·99	1,047,642·00
Shinyanga	27,000	500	2,777·45	295·78	3,073·23	798,393·00
Tanga Province:						
Same ...	320	110	40	12	52	5,914·86
Korogwe	1,190	25	12	2	14	13,543·20
Handeni...	3,500	64	19	5	24	3,956·53
Northern Province:						
Arusha ...	400	5	12	1	13	4,015·00
Moshi ...	2,500	30	91	15	106	29,780·00
Mbulu ...	1,520	7·25	25·5	6·5	32	7,713·00
Eastern Province:						
Kilosa ...	6,400	130	338	180	518	116,685·00
Morogoro	10,009	170	293	113	406	95,246·00
Mahenge...	9,000	140	685	63	748	190,680·00
Bagamoyo	8,905	103	205	70	275	64,753·00
Uzaramo	683	9	3	2	5	980·00
Rufiji ...	15,000	375	956	37	993	281,199·00
Southern Province:						
Kilwa ...	7,740	64	43·836	17·365	61·201	13,156·05
Lindi ...	6,400	78	108·845	31·558	140·403	32,207·03
Masasi ...	2,400	24	32·354	2·626	33·980	8,829·82
Tunduru...	4,400	54	69·453	2·746	72·199	16,748·98
Mikindani	1,600	44	98·407	21·560	119·967	43,048·20
Total ...	244,144	5,366·25	25,391·315	1,974·785	27,366·100	7,286,126·67

ANNUAL REVIEW OF THE CENTRAL PROVINCE, 1945

Staff

(i)—(a) *European.*—Mr. J. V. R. Brown, Senior Agricultural Officer, Dodoma, 1.1.45-12.4.45; Mr. D. Thornton, Acting Senior Agricultural Officer, Dodoma, 13.4.45-6.12.45; Mr. E. T. Ward, Agricultural Officer, Dodoma, 10.10.45-31.12.45; Mr. G. S. Brown, Agricultural Officer, Singida, 1.1.45-31.12.45; Mr. C. E. Allen, Agricultural Assistant, Dodoma, 6.3.45-31.12.45; Mr. M. L. Reiner, Agricultural Assistant, Kondoa, 1.1.45-31.12.45.

(b) *Asiatic.*—Mr. F. H. Walji, Temporary Clerk, 3.9.45-31.12.45.

(c) *African.*—One Grade III L.C.S. Clerk, 1.1.45-28.8.45; one Grade III L.C.S. Instructor; twenty-one Ungraded L.C.S. Instructors; seventy-three War Production Staff Instructors; one Messenger; three Ungraded Recorders.

(ii) The Native Authorities employed an average of about ninety Instructors. There was therefore a total of 185 Instructors in the field. The average quality of these men is not as high as we could wish but it is slowly improving and they have done much good work during the year.

Weather

Throughout the Province the rains broke unusually early, so early that cultivators in many areas could not believe that the rains had really come to stay and so did not make use of the first good showers for planting. In both October and November rainfall was far more copious than usual. In December the precipitation was below normal in the north but above normal, though poorly distributed, in the south. In January the amount was about normal but distribution, generally speaking, was bad. During March and April, a vital time for heading grain, there were long dry spells which seriously affected yield. Therefore although the statistics given in Annexure I show that the aggregate rainfall for the season was about normal in Kondoa and Singida and fifty per cent above normal in Dodoma District, the weather was not really very favourable. There was far more rain than necessary in the first half of the season and far too little in the second half.

Food Crops

At the opening of 1944/45 agricultural year the food position was satisfactory. Supplies in the hands of the peasants were adjudged to be adequate in all but a few very small areas. In addition there were 3,600 ton of grain held by the Native Authorities in silos or in native type storage vessels.

The early rains were good but their very earliness and abundance were somewhat of an embarrassment since clearing and manuring were not yet completed. Furthermore the cultivator in many cases failed to make the best use of the first rains because they feared that these would turn out to be nothing but a flash in the pan and not the real thing. Nevertheless, on the whole, planting conditions were very good and in spite of heavy weed growth and some loss of seed through water-logging very fair acreages of grain

were established, though not quite so large as in 1943-44. The shortfall in grains was probably more than made good by the increased plantings of sweet potatoes. In Kondoa, for instance, the Agricultural Assistant reports that never before have such large areas been planted to this crop.

Throughout January and February the grain crops made very fair growth and although anxiety was caused in several parts of Kondoa, Singida and Manyoni owing to localised droughts of varying periods general prospects were still good. The droughty conditions in March and April, when the crops were in ear, altered the position radically, and when it became apparent in April and May that stalk-borer infestation was widespread and very heavy all hope of a really good harvest died.

Instead it soon became clear that although this Province would be self-supporting except for certain requirements of townships and minor settlements there would probably be numerous scattered areas of local shortage. This did indeed prove to be the case. At the end of the year the Unyangwira Chiefdom of Manyoni in Kondoa may require 120 tons; other minor shortages were reported in Kinyambwa (Dodoma), Burungi and Suruke (Kondoa-Irangi), Tulia, Issue, Wilwana, Mwaru Mgori, Singida and part of the Iramba plateau (Singida). However by the end of 1945 the reserves, built up by contributions from cultivators, held in Native Authority silos and stores had been increased from 3,600 to about 4,000 tons. So that, although it was a disappointing year, one can say that the gains on the food front which were achieved in 1944 were just about held—perhaps rather more than held if one considers the steady and largely voluntary expansion of the sweet potato acreage. With regard to this crop the Acting Agricultural Officer, Singida, writes: "Every householder now has sweet potatoes and it is routine every year to plant this crop."

Similarly the Agricultural Assistant, Kondoa, says: "In contrast to our 1944 report we can think of no place where sweet potatoes have not become popular."

There are some places, notably in the Bahi Depression, where sweet potatoes do not flourish; in such areas efforts are being made to get more cassava planted; planting material was imported from Tabora.

It is satisfactory to be able to record that the issue of improved varieties of seed from Native Authority farms has been of real benefit to many cultivators. The Agricultural Assistant, Manyoni, writes: "There has been a good demand for Dobbs sorghum which has proved to be fairly drought resistant and does well in the Depression areas . . , bulrush millet is also popular though issues have not been so widespread as in the case of Dobbs."

The Acting Agricultural Officer, Singida, states: "In the Mikalama area the grain crop was saved by the production of Dobbs; the local grain completely failed but Dobbs survived . . . "

Prevention of Famine

The threat of famine has hung for years, like a sword of Damocles, over the heads of all who live and all who work in the Central Province. Until it is removed none can lay plans for the amelioration of the lot of the people with any assurance that it will be possible to execute the plans. Measures for the prevention of famine are, therefore, the number one priority.

The efforts required of the people for their own salvation—namely the planting of additional acreage of grains, the use of manure on the biggest

possible scale and the growing of sweet potatoes—were pressed for assiduously by the Provincial Administration in all districts. While the grain acreage was perhaps not quite equal to that of 1944 owing to the climatic difficulty already recorded, the sweet potatoes crop was larger and manuring was, for the most part, very satisfactory. The Agricultural Assistant, Manyoni, for instance, writes: "The non-stock-owning people exchanged stover for manure and in this way almost every shamba had a good dressing." The stacking of stover for feed and bedding is not readily carried out, but by dint of persistent pressure a fair measure of success was achieved in areas were alternative feed in the form of grazing is available.

Reference has already been made to the addition of about 400 tons to the anti-famine grain reserves by the collection of the further contributions from cultivators. The erection of permanent silos to hold this grain, most of which is at present stored in native type grain bins, was continued under the supervision of the Provincial Administration. The following silos are at present in existence:—

District and Locality	Number	Total capacity tons
Singida:		
Ilongero	3	150
Ihanja	1	120
Mgori	1	50
Iguguno	2	110
	13	780
Kondoa-Irangi:		
Kolo	3	150
Kalema	3	150
Kwa Mtoro	1	50
	7	350
Dodoma Division:		
Dodoma Native Authority Farm	2	100
Bahi	3	150
Kikombo	3	150
Zanka	3	150
	11	550
Mpwapwa Division:		
Kongwe	1	50
Sagara (Bwaga)	1	50
Mlali	1	50
Kibakwe	1	50
Mpwapwa	2	100
	6	300
Total	37	1,980

In 1946 it is planned to erect additional silos as follows:—

	Silos	Tons
Dodoma Division	21	1,050
Manyoni Division	8	400
Mpwapwa Division	6	300
Singida	22	1,100
Kondoa-Irangi	12	600
	69	3,450

There will then be permanent storage for 5,330 tons of grain in the Province.

The new silos are to be of a slightly modified design. Trouble was experienced in securing a water-tight seal around the man-hole in the roof of the old type. In the new ones the man-hole has been replaced by a small door set in the gable of the silo.

Cash Crops

In the following paragraphs the figures of production represent the amounts in metric tons of produce sold in Native Authority markets.

(a) *Grains (production in tons).*

	Dodoma	Singida	Kondoa	Total
1940 ...	1,959	442	999	3,400
1941 ...	1,708	976	693	3,377
1942 ...	11	95	479	585
1943 ...	—	206	—	206
1944 ...	425	232	29	686
1945 ...	471	296	92	859
Value in 1945 ...	£2,378	£1,640	£398	£4,416

The grains consisted almost entirely of maize or maize flour, except for some 60 tons of sorghum and 16 tons of eleusine millet in the case of Singida, but, as has already been mentioned, it was possible to increase the grain reserves held by the Native Authorities by about 400 tons despite the ravages of stalk-borer and, in some areas, severe damage by birds.

Yellow maize seed issued from Native Authority Farms is reported to be popular in Singida but less so in Kondoa-Irangi.

(b) *Rice (production in tons).*

	Dodoma	Singida	Kondoa	Total
1940 ...	337	7	2	346
1941 ...	198	9	3	210
1942 ...	496	12	23	531
1943 ...	9	9	—	18
1944 ...	140	1	—	141
1945 ...	27	2	—	29
Value in 1945 ...	£460	£30	—	£490

The heavy rains early in the season caused flooding which delayed transplanting, and the dry spells later on prevented satisfactory growth. The bulk of a small harvest was retained for home consumption.

(c) *Groundnuts (production in tons).*

	Dodoma	Singida	Kondoa	Total
1940 ...	1,185	927	152	2,264
1941 ...	785	1,200	118	2,103
1942 ...	1,360	1,966	185	3,511
1943 ...	48	821	2	871
1944 ...	887	256	18	1,161
1945 ...	905	353	2	1,260
Value in 1945 ...	£10,236	£3,466	£16	£13,718

After a promising start the groundnut crop was badly hit by droughty spells. In Singida especially premature flowering and rosette disease were common. In areas of food shortage much of the crop was retained for home consumption.

(d) *Onions (production in tons).*

	Dodoma	Singida	Kondoa	Total
1940 ...	10	40	10	60
1941 ...	7	78	8	93
1942 ...	30	89	5	124
1943 ...	8	134	22	164
1944 ...	51	74	16	141
1945 ...	73	122	61	256
Value in 1945 ...	£1,480	£1,501	£952	£3,933

The figures do not fully reflect the progress made. It is reported that considerable quantities were bought up outside the markets. Nevertheless progress can be considered very satisfactory especially in view of the scarcity of seed. The quality of bulbs from the seed supplied through the Department was the subject of favourable comment.

(e) *Potatoes (production in tons).*

	Dodoma	Singida	Kondoa	Total
1940 ...	22	12	3	37
1941 ...	23	15	5	43
1942 ...	25	18	5	48
1943 ...	38	2	6	46
1944 ...	32	3	17	52
1945 ...	5	8	27	40
Value in 1945 ...	£67	£100	£463	£630

The figures of this crop have been included in order to maintain the continuity of records but it hardly appears to merit very serious attention in this part of the Territory.

(f) *Gum, Beeswax and Honey.*

	Dodoma		Singida		Kondoa		Total	
	Gum	Wax	Gum	Wax	Gum	Wax	Gum	Wax
1940 ...	35	16	165	8	—	14	200	38
1941 ...	34	31	152	7	—	19	186	57
1942 ...	56	21	218	9	—	18	274	48
1943 ...	27	88	138	36	—	26	165	150
1944 ...	80	15	281	8	—	8	361	31
1945 ...	20	15	150	5	1	14	196	34
Value in 1945 ...	£917	£2,157	£6,978	£731	£34	£1,957	£7,929	£4,845

In addition, appreciable amounts of honey were sold, namely Dodoma 28 tons (£1,565); Kondoa 63 tons (£2,417). It is reported that in Singida the value of gum grading in markets is largely negatived by the re-mixing of clean gum with dust and with dirty gum after removal from the markets.

(g) *Castor Seed.*—There was a little boom in this trade, 160 tons valued at £1,742 passing through Dodoma markets compared with 33 and 28 tons in the two previous years.

(h) *Wheat.*—This crop again failed except in very restricted areas where irrigation is possible.

(i) *Pulses.*—Some 76 tons of pulses, valued at £710, were sold on Dodoma markets, kidney beans and cowpeas being the main constituents. In Kondoa the equivalent figures were 34 tons, worth £320; and in Singida 3 tons worth £31. In the latter district trial plots of soya beans have shown some promise.

(j) *Rubber.*—On Hika and Muhalala Estates, Manyoni, 21½ tons of Ceara rubber were produced.

Pests and Diseases

(i) *Desert Locust.*—A few small flying swarms were in the Province at most times between November 1944 and June 1945 but there was little damage done and no egg-laying reported. In December 1945 a swarm was reported in Kondoa-Irangi.

(ii) *Stalk-borer* did serious damage to sorghum in many areas.

(iii) *Sweet Potato Virus.*—The presence of this disease in a mild form was confirmed by the Plant Pathologist; it is widespread but apparently not very harmful in these conditions.

(iv) *Covered Smut of Sorghum* was rather prevalent on Dobbs sorghum, both on the Dodoma Native Authority Farm and in the District.

(v) *Vermin.*—Baboon, pig and game took their usual toll.

Soil Conservation

A number of works have been carried out by gangs of paid labour to protect both roads and the fields whose run-off had been damaging the roads. In Singida District an average of 200 men were employed daily for six months on this kind of work. Sections of the following roads were protected by contour banking the land above them:—

Kinyangiri to Mikalama.
Kinyampanda to Kisiriri.
Masimba to Kiomboi.
Singida to Mgori.
Singida to Ilongero.
The Sekenke road in the Wembere.

At mile six on the Dodoma-Iringa road the Agricultural Assistant, Manyoni, in co-operation with the Public Works Department, successfully carried out a difficult piece of protective work in the Mkonse hills. An over-grazed area of about 4 square miles was discharging its run-off across the main road. About one-fifth of it was contour banked, storm drains were put in and the whole area closed to grazing.

A similar but smaller job was carried out at mile 15 on the Dodoma-Mpwapwa road.

Communal (unpaid) turn-outs for the purpose of constructing contour banks were discontinued because experience has shown that, although the work is effective, the amount which can be carried out annually is trivial when compared to the vast areas requiring treatment. The policy now favoured is individual effort on the part of the cultivators, each of whom is responsible for protecting his own field by means of contour banks of a smaller size than those constructed by communal effort. In the Dodoma Division each man was required to make not less than three banks in his field, the lines of the banks being demarcated by Instructors with striding levels. The area dealt with embraced the hilly areas within a radius of 25 miles of Dodoma Township. Fourteen Instructors were employed. They began work in September and completed demarcation throughout most of that area. The actual banking was not started until towards the end of the year when rain had softened the ground.

In Manyoni Division less has been possible owing to lack of spirit levels; however, ridging is normal practice in the upper areas of this division and contour planting with tie-ridging has been insisted upon.

In the lower areas the advance of tsetse fly has curtailed the extent of the grazing grounds and, furthermore, watering places are scarce; the resulting heavy concentrations of cattle in small areas are causing serious erosion which will be difficult to combat until the tsetse are pushed back and new water supplies created.

In Kondoa-Irangi approximately 10 square miles of contour banks were demarcated; the Warangi are reported to have responded well and it seems probable that it will be easier to persuade them to put in small contour banks at ten yards intervals than to adopt contour ridging. The small contour banks are about four feet wide with a three feet wide by one foot deep trench on their upper side. When correctly made these banks have proved effective; if the quality of the work can be kept at a high level this measure may prove to be the easiest local solution to the problem of erosion on arable land; but if the quality of the work is not good it may still be necessary to enforce the unpopular practice of contour ridge cultivation.

In Singida the Acting Agricultural Officer reports that, although the amount of the work which could be done was limited by the small number (nine) of spirit levels available, great progress has been made. Apart from the road protection projects already mentioned, the Acting Agricultural Officer states: "some thousands of shambas have been contour banked during the year . . . the people of the small chiefdom of Issue have completely contoured all their shambas . . . All round Singida Township the contour banking has been continuing . . . ."

Grazing Reserves

The demarcation of forty-seven grazing reserves was recorded in the annual report of 1944. No more have been added. The existing ones have not all been well maintained. Provision has been made in the 1946 Native Treasury Estimates for the engagement of a number of grazing guards to assist the Native Authorities by policing the reserves in the close season and by supervising the eradication of regenerating scrub. As soon as the present reserves have been brought into satisfactory condition and under better control it is intended to demarcate new ones.

Water Supplies

Singida.—Five wells, of which three are successful, were dug in the Tumeri area.

Kondoa.—A number of small surface dams were made at Chungai under the supervision of an Officer of the Tsetse Research Department. Their success seems to indicate that the importance of evaporation in this region may have been overestimated, and that it may be possible to rely on dams shallower than was previously thought safe.

Dodoma.—In order to prevent stock concentrations and resultant erosion around existing water holes the following new hafirs were constructed by communal turnouts :—

Place	Chiefdom
Segele	Masanga
Kidachi	Mwitikira
Goima	Makutupora
Idifu	Mvumi
Ngungu	Dodoma
Manchale	Buigiri
Manyoni Division:	
Kitalalo	Unyangwira

At Ikasi in Mgunduko Chiefdom a water hole was cleaned out and the spring was uncovered; it yielded 300-400 gallons per hour. A silted up rock tank at Iseke was cleaned out. Hafirs at Buigiri, Msanga, Nondwa and Mwitikira were cleaned and repaired. Work has begun on the enclosure of a spring near Kilimaninde. Two windmills were repaired. A dam scraper team was assembled and the oxen and the drivers received initial training. The unit consists of 42 oxen, 4 ploughs and 12 scrapers.

The Agricultural Assistant, Manyoni, was responsible for the supervision of the most of the foregoing work; valuable assistance was received from the Veterinary Department and the Engineering Geologist of the Public Works Department.

Rehabilitation

Kondoa-Irangi.—The controlled movement of the population and their stock from the most congested sections of the Irangi plateau to reception areas below it was begun in a very small way late in 1944 when 21 families emigrated. In 1945 Rules for the Rehabilitation of Irangi, a copy of which is attached as Annexure III, were promulgated by the Native Authority with the approval of His Excellency the Governor under section 15 of the Native Authority Ordinance. The gist of the rules is that each village area is put into one of three categories, namely: (a) Areas into which immigration is permitted but from which emigration, except to another chiefdom, is forbidden; (b) areas in which neither immigration nor emigration, except to another chiefdom, is allowed; (c) areas into which immigration is forbidden and from which a man may not only emigrate but may be required to emigrate.

The rules were required to enable population densities to be so controlled that not only may congestion in certain areas be avoided but also that in areas threatened by the advance of tsetse-fly there should remain a high enough density of people and stock to keep down regenerating bush. Under these rules a further 77 families were moved in 1945; the tentative target for 1946 is the resettlement of 1,000 families.

Singida.—A population and stock survey of an area at Ikunge was completed by the Acting Agricultural Officer and is to be followed in 1946 by a survey of crops and grazing grounds in the area. Upon the results will be based such measures as may be considered necessary for the rehabilitation of the area: that is, stock culling, expansion of grazing grounds, creation of grazing reserves, etc. It is intended to adopt only such measures as could, without additional staff or funds, be readily duplicated elsewhere on a large scale if they prove successful on a small scale at Ikunge.

Dodoma.—In the Central Province a great deal of the necessary reclamation work involves the clearing of bush. The mechanisation of this work has often been advocated. In 1945 two blocks of bush of 100 acres each, one at Msalatu (mile 6) and one at Makutupora (mile 16) on the Dodoma-Kondoa road were selected for trial clearing. Each block was divided into three sections, the first section to be cleared by manual labour, the second by a bulldozer loaned by the Department, the third by a combination of both methods. The object was to study the efficiency and the cost of the three methods. The clearings were not completed until January 1946 and at the time of writing the cost sheets have not yet been made up. The costs of the work were divided between the Department (the operating charges for the bulldozer) and the Native Treasury (the payment of the manual labour). It is intended to settle a few families on the clearings and have them work the land under a simple system of alternating arable and grass strips.

Tsetse.—No account of rehabilitation projects would be complete without some reference to the tsetse fly position which is causing much anxiety, and threatens to increase the already formidable difficulties in the way of rehabilitation. This is not the place to describe the position (which is receiving the active attention of the Department of Tsetse Research) in any detail. Suffice it to say that : (1) there is a very serious threat of *G. morsitans* advancing to the Chenene hills, in south-east Kondoa, and thence sweeping through hundreds of square miles of clean miombo bush, (2) defensive measures are needed against an advance of fly from the west-south-west into the more densely inhabited parts of Manyoni, (3) Singida District is menaced from both east and west, (4) in a number of places the fly is forcing people back and compressing them into a diminishing area of clean country which is already overstocked or overcultivated, whereas movement in a precisely reserve direction is a prerequisite of rehabilitation.

Native Authority Seed Farms

On the Dodoma farm there were approximately 30 acres of land under grain multiplication. Another 10 acres were used for experimental purposes. Yields were not so good as last year but about six tons of seed were available for distribution. In addition 27 lorry loads of sweet potato cuttings were obtained from a 10-acre multiplication plot and were distributed. The results of the experimental work and further details of the multiplication plots are summarized in Annexure IV to this report.

On the Igugunu (Singida) farm yields of Dobbs sorghum were good, averaging 749 kilos per acre on about 13½ acres. The other sorghums, Bukuru Mahemba, Bukuru Masara, and Wiru and Kichwa Mkono millet, of which just under one acre of each was grown, gave poor yields. Tepary beans at 468 kilos per acre seem worth more attention. Soya beans were erratic giving, on four different plots, yields of 165, 262, 309 and 910 kilos per acre; further trial seems indicated. Eight-row yellow maize yielded 420 kilos per acre. The gross yield of all crops from the 30 acres under cultivation was approximately 14 tons. Of this, about 10 tons of Dobbs sorghum, 1¼ tons of yellow maize and 1 ton of various pulses and groundnuts were available for distribution. A creamery, a hide drying shed, a dispensary and a goat house, all of burnt brick, have been erected during the year.

The small farm at Kondoa produced good crops but owing to inadequate storage facilities there was an accidental mixing of seed of different varieties after harvest and more could be issued.

Acknowledgments

In every phase of agricultural activity the officers of the Provincial Administration throughout the Province have taken the keenest interest, and have given their fullest support to our own rather thinly spread staff, who also had the advantage of the most helpful co-operation of officers of the Departments of Veterinary Services, Tsetse Research and Public Works.

R. B. Allnutt,
Acting Senior Agricultural Officer

SUMMARIZED RAINFALL STATISTICS FOR SELECTED STATIONS IN THE CENTRAL PROVINCE: 1944/45

(*Inches*)

Month	Dodoma 2nd Order Station		Bahi Railway Station		Mpwapwa 2nd Order Station		Kondoa 2nd Order Station		Singida	
	Month	Accumulated Total	Month	Accumulated Total	Month	Accumulated Total	Month	Accumulated Total	Month	Accumulated Total
1944—										
October	2·33	2·33	–	–	·79	·79	1·61	1·61	·77	·77
Average	·04	·04	·01	·01	·17	·17	·12	·12	·09	·09
November	8·80	11·13	13·60	13·60	11·59	12·38	7·18	8·79	3·59	4·36
Average	·59	·63	3·44	3·45	·59	·76	1·05	1·17	1·56	1·65
December	6·52	20·62	13·75	27·35	5·93	18·31	2·35	11·14	4·91	9·27
Average	3·49	4·09	8·62	12·07	4·16	4·92	4·48	5·65	5·27	6·83
1945—										
January	3·27	23·89	8·41	35·76	8·68	26·99	3·29	14·43	6·71	15·98
Average	6·22	10·31	9·26	21·33	5·86	10·78	5·37	11·02	6·16	12·99
February	3·99	27·88	7·52	43·28	4·15	31·14	4·15	18·58	4·67	20·66
Average	4·28	14·59	5·25	26·58	5·46	16·24	4·55	15·57	4·32	17·31
March	2·69	30·57	5·31	48·59	7·45	38·59	4·41	22·99	7·38	28·04
Average	5·83	20·42	8·07	34·65	6·00	22·24	5·82	21·39	5·54	22·85
April	·83	31·40	6·60	55·19	1·54	40·13	1·08	24·07	·10	28·14
Average	1·77	22·19	4·22	38·87	2·82	25·06	3·76	25·15	2·70	25·55
May	·91	32·31	1·44	56·63	2·17	42·30	1·31	25·38	1·44	29·58
Average	·20	22·39	·53	39·40	1·06	26·12	1·44	26·59	·39	25·94
June	–	32·31	–	56·63	–	42·30	–	25·38	–	29·58
Average	·01	22·40	·02	39·42	·13	26·25	·06	26·65	·08	26·02
July	–	32·31	–	56·63	–	42·30	–	25·38	–	29·58
Average	–	22·40	–	39·42	·03	26·28	·01	26·66	·03	26·05
August	–	32·31	–	56·63	–	42·30	–	25·38	–	29·58
Average	–	22·40	–	39·42	·03	26·31	·01	26·67	·02	26·07
September	–	32·31	–	56·63	–	42·30	–	25·38	–	29·58
Average	·09	22·40	–	39·42	·11	26·42	·07	26·73	·08	26·15

RULES FOR THE REHABILITATION OF IRANGI ISSUED UNDER SECTION 15 OF THE NATIVE AUTHORITY ORDINANCE, CAP. 47 OF THE LAWS

In accordance with the powers given me by section 15 of the Native Authority Ordinance, Cap. 47 of the laws, I, Chief Salim Kimolo of Irangi, issue the following rules:—

1. No person in the Irangi Chiefdom may move his place of residence from the area of one Mwanangwa (subordinate headman) to that of another without the written permission of the Chief.

2. Any person applying for permission to move shall be granted such permission only if he does not reside in an area included in Schedule A or B and such permission will only be given to move into areas included in Schedule A.

3. Any person residing in one of the areas included in Schedule C may be ordered by the Native Authority to leave such area and move to a specified area included in Schedule A. Any person so ordered shall, having taken up residence in an area under Schedule A, be precluded by rule 2 from leaving such area.

4. Any person residing in an area included in Schedule A shall keep cleared all land within a radius of 120 yards of his house; where a distance of 240 yards does not exist between houses, the owner of each house shall be responsible at all times for preventing regeneration in an area of 10 acres of land adjacent to his house.

5. *Provided* that nothing in the above rules shall prevent any person from leaving the Irangi Chiefdom to reside in any other chiefdom; and provided that the above rules shall be used only for the maintenance and furtherance of tsetse clearings or for the rehabilitation of soil eroded areas or for the prevention of famine.

6. Any breach of the above rules shall render the offender liable to a fine not exceeding Shs. 200/- or to imprisonment for a period not exceeding six months or to both such fine and imprisonment.

Schedule A

(1) All the areas of the Bereko, Pahi and Busi Jumbeates below and to the east of the escarpment.
(2) The areas of Kikilo in the Bereko Jumbeate.
(3) The western halves of Masawe and Thawi Wanangwaates adjacent to the Bubu River.
(4) All the area of the Irangi Chiefdom lying to the west of the Bubu river from the Kondoa-Mbulu border to Lake Serya.

Schedule B

The Wanangwaates of Thawi, Masawi, Sokola, Changaa, Tumbelo in the Kolo Jumbeate, and Tura, Suruke, Mnangali in the Suruke Jumbeate.

Schedule C

(1) After 1st September 1947, the areas included in the Bereko and Isabe Native Authority Forest Reserves.
(2) The Wanangwaates of Kolo, Hemba, Choka, Baura, Bolissa of the Kolo Jumbeate.
(3) The Wanangwaates of Aya, Mpaka, Madabachu and Mondo of the Mondo Jumbeate.
(4) The Wanangwaates of Gayu, Haubi and Kalamba in the Pahi Jumbeate.
(5) The Wanangwaates of Mwisanga in the Busi Jumbeate.
(6) The Manangwaates of Unkuku in the Suruke Jumbeate.

(Sgd.) S. Salim Kimolo,
Chief of Irangi

CERTIFICATE

These are the rules of the Native Authority of Irangi referred to in my certificate.

J. S. Darling,
Translator,
District Commissioner

Kondoa, Irangi,
18th March 1945

Approved by the Governor

G. R. Sandford,
Chief Secretary to the Government

Dar es Salaam,
5th April 1945

REPORT ON DODOMA NATIVE AUTHORITY FARM, 1945

The experiments carried out in 1945 were in all cases repetitions or continuations of those reported last year in Annexure I to my annual report for 1944, which should be read in Annexure I to my annual report for 1944, which should be read in conjunction with the present report if more detailed information regarding the treatment is desired.

The climatic conditions in 1944/45 were good in the early part of the season but bad during the maturation period. About 31 inches of rain were recorded during the period 1st October 1944 to 30th April 1945. Of this amount two-thirds had fallen by the end of December. During March and April when the grains were setting and maturing there was only about 3½ inches of rain.

Experiment I.—Local Cultivation Methods

Treatments	Yields in kilos per acre		
	1943	1944	1945
Awned Bulrush Millet planted by: -			
1. Ugogo method	52	177	155
2. Unyaturu method	51	147	119
3. Irangi method	145	369	199
4. Unyiramba method	123	375	285
5. Unyamwezi method	164	376	221
Difference required for significance (P=·05)	45·4	104	Not significant

This is the first year in which the Unyamwezi method did not head the list—possibly because the ridges held up too much water for the comfort of the plant in the early stages of growth when the rains were exceptionally heavy.

Experiment II.—Local or Suggested Planting Methods

Treatments:

(a) Planting on top of last year's ridge without any stirring of soil.
(b) Planting on side of last year's ridge, without stirring of soil.
(c) Planting on top of last year's ridge, after stirring the soil on top, and ridging up round the plants later.
(d) Planting on newly made ridges.
(e) Planting on the flat without stirring the soil, and a ridge made round the plants in the rows later.
(f) Planting in between pits of one yard square from 6 in. × 9 in. deep, dug in the dry season, in the fashion of the Wamatengo.
(g) Planting on the flat without any stirring of soil. (Ugogo method).
(h) Planting in the furrows of last year's ridge, the ridge being drawn up round the plants later.

Treatments	Yields in kilos per acre		
	1943	1944	1945
Awned Bulrush Millet, planted as above:			
(a)	452	349	313
(b)	364	320	247
(c)	369	587	317
(d)	353	559	272
(e)	516	498	312
(f)	465	378	302
(g) (Control)	558	322	299
(h)	357	485	324
Difference required for Significant (P = ·05)	106	138	Not significant

The results are inconclusive.

Experiment IIIa.—Methods and Rate of Applying Manure

Treatments:

(a) 1 ton per acre applied in small heaps on the flat and partly incorporated with the first surface scraping of weeds (Ugogo method).
(b) 3 tons per acre applied in small heaps on the flat and partly incorporated with the first surface scraping of weeds (Ugogo method).
(c) 5 tons per acre applied in small heaps on the flat and partly incorporated with the first surface scraping of weeds (Ugogo method).
(d) 3 tons per acre buried under newly made ridge (Unyamwezi method).

(e) 3 tons per acre applied in the old ridge which has been specially opened up to receive it; afterwards the soil is returned to cover the manure.

(f) 3 tons per acre applied on the flat in little heaps and dug by means of cultivation to a depth of 9 inches (Iramba and Irangi method).

(g) No manure. Planted Kigogo method.

Treatments	Yields in kilos per acre 1943	(1st year residual) 1944	(2nd year residual) 1945	Total 1943 to 1945
Awned Bulrush Millet manured in 1943 as above:				
(a)	89	162	144	395
(b)	63	176	143	382
(c)	122	283	175	580
(d)	127	308	242	677
(e)	94	178	137	409
(f)	124	216	169	509
(g)	31	86	143	260
Difference required	47	100	Not	Not
Significance (P = ·05)			significant	analysed

It should be noted that in the second and third seasons no preliminary cultivation was done on any plot, nor was any manure applied.

Experiment IIIb.—Methods and Rates of Applying Manure
(Repetition of Experiment IIIa)

Treatments	Yields in kilos per acre 1944	(1st year residual) 1945	Total 1944 and 1945
Awned Bulrush Millet manured in 1944 as in IIIa above:			
(a)	355	185	540
(b)	404	188	592
(c)	569	222	791
(d)	487	187	674
(e)	561	171	732
(f)	445	216	661
(g)	345	150	495
Difference required for	155	Not	Not
Significance (P = ·05)		significant	analysed

Experiment IV.—Quick Maturing Sorghum Trial
(Repetition of 1944 trial)

Variety and Origin	Yields in kilos per acre 1943	1944	1945
Kuyu (Usukuma)	–	747	189
Shimba wa Nera (Usukuma)	590	718	376
Mgalle (Manyoni)	–	568	221
White Lugugu (A local Bukura type)	260	512	229
Nzanza (Ukara Island)	605	505	358
Dobbs (Kenya)	470	458	285
P. 127 (Swaziland)	–	173	138
P. 133 (Swaziland)	–	170	162
P. 41 (Swaziland)	–	154	89
Difference required for (P=·05)	200	–	95
Significance (P=·01)	–	38	–

The Swaziland sorghums were again handicapped by patchy stands owing to poor germination caused by weevil damage. Birds also damaged the Swaziland selections seriously and Kuya slightly. Dobbs suffered from covered smut. Shimba wa Nera maintained its previous good reputation.

Experiment V.—Late Maturing Sorghum Trial
(Repetition of 1944 trials)

Manured at 3 tons per acre; manure buried in old ridges.

Varieties	Yields in kilos per acre		
	1943	1944	1945
Bukura Mahemba	395	920	401
Bukura Masara	446	759	344
Hemba Hemba	–	612	321
Lugugu Red	203	610	283
Wiru Bumabele	–	503	322
Wiru Mahoge	–	457	257
Awned Bulrush Millet	309	412	363
Lugugu White	260	412	299
Difference required (P = ·05) ...	200	–	–
For significance (P = ·01)	–	172	Not significant

Although no significant differences emerged from 1945 planting the two Bukuras maintained their position at the head of the list of sorghums in this trial.

Experiment VI.—Spacing Trial

Treatments	Yields in kilos per acre	
	1944	1945
Awned Bulrush Millet spaced at:		
(1) 9 square feet per hole	143	107
(2) 6 square feet per hole	140	99
(3) 3 square feet per hole	149	110
Differences not significant.		

In 1945 treatments (2) and (3) were thinned to 3 plants per hole; treatment (1) was unthinned. For the second time the theory that the Wagogo space their millet too widely was not proven.

SUMMARY OF HARVEST FROM MULTIPLICATION PLOTS

Crop	Acres	Kilos	Average yield in kilos per acre
Awned Bulrush Millet	10	2,212	221
Dobbs Sorghum	10	1,709	171
Shimba wa Nera Sorghum	9	831	92
Bukura Masara	1	380	380
Bukura Mahema	1·2	554	462
Sweet Potatoes	10	27 lorry loads	2·7 lorry loads
	41		

SUMMARY OF HARVEST FROM TRIALS

Crop	Kilos	Crop	Kilos
Awned Bulrush Millet	934	Shimba wa Nera Sorghum	46
Nzanza Sorghum	44	Nukura Mahembe Sorghum	49
Dobbs Sorghum	41	Bukura Masara Sorghum	42
Nuya Sorghum	33	Wiru Magohe Sorghum	32
Ngale Sorghum	27	Wiru Bumabele	40
P. 41 Sorghum	11	Hemba Hemba Sorghum	39
P. 127 Sorghum	16	Lugugu (White) Sorghum	65
P. 133	20	Lugugu (Red) Sorghum	35

TOTAL PRODUCTION

Sorghum	4,014 kilos
Awned Bulrush Millet	3,146 ,,
Sweet potato vines	50 tons

ANNUAL REVIEW OF THE EASTERN PROVINCE, 1945

Staff

European.—(a) Mr. A. H. Savile, Senior Agricultural Officer, was in charge of all agricultural work in the Province until he proceeded on vacation leave on 6th October.

(b) Mr. C. J. M. Krige, Agricultural Officer, was in charge of agricultural work at Morogoro until May when he was transferred to Arusha. He was transferred back to Morogoro at the end of August and took over from Mr. Savile at the beginning of October.

(c) Mr. C. M. H. Sutherland, Agricultural Officer, was in charge of Ulanga District throughout the year. He proceeded on two months' annual leave from 21st May to 25th July.

(d) Mr. A. A. E. Weirich, Senior Agricultural Assistant, was in charge of Bagamoyo and Kiserawe districts until he proceeded on vacation leave in June. He returned from leave early in October and was posted to Bagamoyo to take charge of agricultural work in Bagamoyo and Kiserawe districts.

(e) Mr. J. C. van Schoor, Agricultural Assistant, was stationed at Morogoro throughout the year. From mid-April to end-May he went to the Rufiji to assist with the planting campaign.

(f) Mr. F. E. Luscombe, Agricultural Officer, arrived here on first appointment in mid-April. At the end of April he was transferred to the Rufiji whence he was transferred to Lindi in mid-June.

(g) Mr. J. D. Hunter-Smith, Agricultural Officer, arrived at Morogoro on first appointment on 2nd December.

(h) Mr. J. M. van Dyk, Agricultural Assistant, arrived at Morogoro on first appointment on 30th June. He was stationed at Morogoro until early November when he was transferred to Kiserawe.

(i) Mr. A. Taylor, Agricultural Assistant, was stationed at Morogoro since 25th July when he arrived on transfer from Mbulu.

(j) Mr. R. B. Silcock, Agricultural Assistant, was in charge of agriculture in the Kilosa District throughout the year.

(k) Mr. R. G. Hoaran, Crop Supervisor, was posted to Kilosa on 18th October.

African.—The departmental Instructor staff numbered 73. One graded Instructor was transferred to Kingolwira Prisons in November. Two permanent men were dismissed for incompetency; the vacancies were filled from War Production Staff. One Recorder and five Instructors were sent to Ukiriguru Training School. Eighty-nine War Production Staff Instructors were engaged on copra work only. Five of these were transferred from the permanent Instructor staff; the sixth Instructor was a new appointment. Four Copra Instructors were employed in Bagamoyo and two in Uzaramo. In Morogoro six Instructors were transferred from War Production Staff to soil erosion work.

Climatic Conditions

In the coastal belt of Uzaramo and Bagamoyo areas rain was practically normal, but heavier than usual in most inland areas which caused early floods in lowland rice areas and retarded the cleaning of newly cleared virgin land. In the Rufiji, Kilosa, Morogoro and Ulanga districts the rains broke towards the end of October and continued without a break till about the end of May. Not only were the rains continuous but precipitations were much above the average during every month from November to May. Another unusual feature was the sudden cessation of the rains towards the end of May followed by an exceptionally long dry and hot season. Except for the coastal areas of Bagamoyo and Uzaramo the effect of such abnormal weather conditions was disastrous on crop production in all inland areas.

In all these areas the general routine of preparing fields for planting starts in November when stover on maize and sorghum fields is burnt and the land is left clean for planting during the December rains. This season (1944-45) the rains, as already stated, started at the end of October and continued without a break to about the end of May. The African cultivator waited for a break in the rains which never came and eventually started cleaning his fields in mid-December. He was therefore six weeks behind his usual routine. In addition he was faced with weed growth of three to five feet high which was impossible to burn. All clearing had to be done by hoeing and a great deal of the litter had to be removed by hand. All these factors not only delayed planting, but also had an adverse effect on the acreage planted by the average cultivator. While one field was being cleared and planted another was being flooded. In addition the task of weeding newly planted fields had increased. To make matters worse there was a serious plague of field mice in the Rufiji, Morogoro, Kilosa and parts of Ulanga districts. This plague caused such severe damage to newly planted grain crops that many fields had to be replanted a second time and a third time. The ultimate result of such abnormal conditions was that marketable surpluses were small, available foodstocks at the end of the year were negligible and in the inland districts large areas were suffering from an acute food shortage.

Agricultural Instruction and Education

Six Instructors who showed aptitude were transferred to the soil conservation staff in Morogoro. These Instructors went round the northern face of the Ulugurus pegging off contour ridges on hundreds of shambas. Some cultivators made an effort at ridging fields that had been contour pegged, but in the majority of fields pegs were pulled out soon after they had been placed because of apathy on the part of the cultivator. Many of the culprits were prosecuted and fined in the Native Authority Courts. Although penalties were severe, the majority of cultivators remained completely indifferent to carrying out soil conservation measures on their shambas. In the Ngurus and Ulugurus three and four contour demonstrations respectively were laid down with the assistance of communal labour turn-outs. Unfortunately these demonstrations have had little or no effect on the cultivators living in the areas where these demonstrations had been laid out.

Propaganda for improved agricultural methods whether it be for better spacing, contour planting, earlier cultivation, preparation and use of nurseries for paddy cultivation, seed selection or soil conservation still conflicts with African conservatism. The old adage "what was good enough for grandpa is good enough for me" is still very deeply ingrained in the African cultivator.

In Ulanga District sleeping sickness settlements were completed at Mbingu and Mgeta. Nine settlements have now been completed. The Agricultural Officer, Ulanga, reports:—"Since 1941 there has been resettlement annually. In view of the fact that settlement has been continuous, there has been very little time to attend to their clearing and development." He advised that the time is overdue for consolidating present settlements rather than opening new ones.

Food Supplies

Owing to abnormal weather conditions and the failure of the 1945/46 short rains the food situation in most districts deteriorated considerably towards the end of the year. Districts that suffered most were Rufiji, Morogoro, Ulanga, and the north-western areas of Kilosa. In Bagamoyo and Uzaramo food supplies were sufficient, but if the short rains fail completely the food situation must become acute on these districts from March till the end of June.

Food Crops in Detail

		Tons		Tons		Tons
Paddy	1943 ...	7,040	1944 ...	6,874	1945 ...	780
Hand-hulled rice ...	1943 ...	964	1944 ...	890	1945 ...	178

Abnormal and continuous rains caused excessive floods, which damaged paddy to such an extent that the crop in the important rice producing districts was almost a complete failure. Rufiji and Ulanga produced 407 and 480 tons respectively compared with 3,300 and 3,000 tons in 1944. The production in Uzaramo was about the average whereas in Kilosa and Morogoro the paddy crop was 75 per cent below average.

Maize.—1943, 5,548 tons; 1944, 8,767 tons; 1945, 4,369 tons. The excessive rains followed by the complete cessation of the rains at the end of May, together with the removal of the subsidy on transport from the out-lying areas, were contributory causes for a 51 per cent drop in the maize crop as compared with 1944. Uzaramo maize crop increased by 100 per cent as compared with 1944.

Sorghums.—1943, 965 tons; 1944, 2,725 tons; 1945, 512 tons. For reasons already mentioned above the sorghum crop had decreased by 82 per cent as compared with 1944.

Beans.—1943, 554 tons; 1944, 900 tons; 1945, 265 tons. The main bean crop is planted towards the end of the long rains. The sudden cessation of the rains towards the end of May was the main cause for a greatly diminished crop. The main bean producing district, Kilosa, produced only 260 tons of beans as compared with an average crop of 600 tons.

Cowpea.—1944, 224 tons; 1945, 81 tons. This crop suffered severely as a result of excessive and continuous rains from November to May.

Green Gram.—Sales amounted to 69 tons as compared with 7 tons in 1944.

Pigeon Pea.—1944, 153 tons; 1945, 114 tons.

Onions.—Despite the fact that the demand for seed far exceeded the supply the crop was a record one. 1943, 110 tons; 1944, 129 tons; 1945, 168 tons.

Potatoes.—1943, 265 tons; 1944, 55 tons; 1945, 17 tons. Poor weather conditions together with Late Blight (*Phytophthora Infestans*) had an adverse effect on the crop.

Vegetables.—1943, 600 tons; 1944, 665 tons; 1945, 724 tons. The latter figure does not include non-native production in Morogoro. A special effort was made last year to increase production in the Ulugurus.

Cassava.—1943, 1,400 tons; 1944, 259 tons; 1945, 1,368 tons. In Morogoro District alone 701 tons were sold during the year. Owing to food shortage in many districts the reserve that had been built up during the past two years has to a great extent been depleted.

Sweet Potatoes.—Although very considerable acreages had been planted in all districts the sudden cessation of the rains in May resulted in very poor crops being harvested.

Cash Crops

Copra.—1943, 5,161 tons; 1944, 4,638 tons; 1945, 5,448 tons. Six Instructors were sent to Zanzibar to be trained in copra grading. Owing to the long dry season the quality of the copra marketed has been better than in previous years. The work of improving the quality of the copra crop has been confined to propaganda and instruction as far as the growers were concerned.

With the appointment of a copra field staff of four Instructors in Bagamoyo and two in Uzaramo a start has been made at rectifying the unsatisfactory conditions existing in so many plantations, native, non-native and Government owned alike. The uprooting and destruction of thousands of dead and unproductive palms will have to be accompanied by a wide scale replanting of selected nuts from high-yielding palms.

Cotton.—1943, 9,822 bales; 1944, 5,110 bales; 1945, 4,780 bales. Climatic conditions were just as unfavourable for cotton production as they were for food production. In most districts the best cotton lands had been flooded before planting had commenced. Planting was a month to six weeks late which affected crop yields adversely. An exceptionally heavy infestation of stainer in Morogoro and Kilosa districts had a disastrous effect on yields and quality of cotton produced. In all districts the uprooting and burning dates were a month earlier than in previous years.

Rubber.—1943, 93 tons; 1944, 245 tons; 1945, 319 tons. Two tons of wild rubber were sold by natives in Uzaramo as compared with 37 tons in 1944.

Sisal.—1943, 26,080 tons; 1944, 31,717 tons; 1945, 33,985 tons.

Jaggery.—1943, 372 tons; 1944, 463 tons; 1945, 730 tons. The acreage under cane is increasing, but production is hampered by the shortage of small power-driven cane mills.

Sesame.—1943, 531 tons; 1944, 606 tons; 1945, 523 tons. The decrease in production is entirely due to poor climatic conditions. 254 tons were sold in Uzaramo and 172 tons in Rufiji.

Cashew Nuts.—1943, Nil; 1944, 463 tons; 1945, 347 tons. 130 tons were sold in Uzaramo and 217 tons in Mafia.

Arrowroot (Tacca Pinatifida).—1943, 243 tons; 1944, 134 tons; 1945, 153 tons. The only sales recorded were 10 tons in Rufiji and 143 tons in Uzaramo.

Beeswax.—1943, 25 tons; 1944, 10 tons; 1945, 4·5 tons.

Charcoal.—1944, 1,155 tons; 1945, 1,269 tons. All charcoal was bought in Uzaramo.

Gum Copal.—1943, 81 tons; 1944, 65 tons; 1945, 27 tons. Eleven tons were bought in Bagamoyo and 16 tons in Uzaramo.

Groundnuts.—1943, 31 tons; 1944, 127 tons; 1945, 88·5 tons. Seventy-three tons were sold in north-western Kilosa, but the bulk of the crop came from over the border of Mpwapwa District.

Coffee.—1943, 11 tons; 1944, 13½ tons; 1945, 14 tons. The whole crop is grown on Custodian estates in the Ulugurus leased by Morogoro Roman Catholic Mission.

Pests

Army Worm.—Mild infestations of army worm occurred during December in northern Kilosa and in the south-western areas of Morogoro. Little damage was done.

Field Mice.—These continued to be a serious menace throughout the rains and the first half of the dry season in Rufiji, Morogoro, Kilosa, Bagamoyo and Tanga districts. A month after veld fires had started the menace seemed to disappear.

Cotton Pests.—Boll worms, both Pink and American, and particularly Dysdercus were serious pests in all cotton growing areas.

Diseases

Head Smut, of sorghum was prevalent in parts of Morogoro and Kilosa districts.

Late Blight (Phytophthora Infestans) continued to be a serious menace in all potato growing areas and caused a further marked reduction in tonnage.

Rice Brown Spot (Helminthosporium Oryaze) caused serious damage to paddy in Ulanga. This disease has been recorded for the first time in the Eastern Province.

Parasites

Striga is becoming an increasing menace in sorghum fields in the areas round about Morogoro.

Soil Conservation

As already reported above, with the aid of communal labour turn-outs, four additional contour tie-ridging demonstrations were laid down in the Ulugurus and three in the Nguru mountains in Morogoro District. Together with demonstrations laid down during 1944 there are now a total of eleven demonstration plots, varying in size from 2 to 12 acres, scattered over the Ulugurus and Nguru mountains. All demonstration plots in 1945 were laid down under the direct supervision of Mr. J. C. van Schoor, Agricultural Assistant. In addition the soil conservation staff of six Instructors, had, with the aid of "A" levels, contour pegged hundreds of native shambas in the Ulugurus. It is regrettable that in many cases the pegs were pulled out almost as soon as they were placed in the ground. The African cultivator in the greater part of the Uluguru and Ngurus still remains completely apathetic to the ravages caused by erosion. In all the areas where demonstrations have been laid out of contour tie-ridging not one native cultivator has made an attempt at doing likewise on his own fields.

In the Chenzema-Mgeta-Kikubo areas the old system of placing weed rows across the slope still remains the general practice. In the remaining areas of the Ulugurus nothing has been done to combat erosion on cultivated fields.

In Morogoro, Kilosa, and Ulanga districts the erosion problem has been aggravated by burning both plain and mountain areas in the dry season. A few culprits were caught and heavily fined, but the vast majority of delinquents escaped punishment. Administrative Officers in all these districts attempted to stop the burning of mountain slopes but their efforts had little or no effect.

It is considered that the damage done by the extensive grass fires in the mountain areas of the Province has set back erosion control for a considerable number of years.

Marketing

All Native Authority markets worked smoothly throughout the Province. In order to preserve food supplies in Ulanga, Morogoro, Kilosa and Rufiji districts, Native Authority markets were closed at the end of September.

Non-Native Agriculture

The Production Committee in Kilosa worked smoothly and effectively whereas in Morogoro the effectiveness of the Committee was largely nullified, not only by the extremely primitive farming methods, but also by the haphazard and irregular way applications were addressed to the Committee. Few Non-Natives submitted returns of acreages and yields.

In Kilosa 1,440 tons of maize produced on Non-Native estates were sold, whereas in Morogoro the total Non-Native maize production amounted to 350 tons, of which 80 tons only were marketed.

The Agricultural Assistant, Kilosa, reports that: "The past two seasons have been a severe test for Non-Native agriculture in this district. Climatic conditions have been appalling and plantations have suffered from flooding and water-logging to an extent never experienced before". Coupled with these conditions there has been the ever-increasing cost and shortage of labour.

Concluding Remarks

Agriculturally, the year has been difficult and disappointing. This report would be incomplete without recording the thanks of the Agricultural Officers in the Eastern Province to all members of the Provincial Administration, who readily co-operated in all matters pertaining to agriculture.

QUANTITIES OF AGRICULTURAL PRODUCE SOLD IN TONS

Produce	Bagamoyo	Uzaramo	Rufiji	Mafia	Morogoro	Kilosa	Ulanga	Total for 1945	1944	1943	1942
Arrowroot ...	–	143	10	–	–	–	–	153	134	234	–
Beeswax ...	1·0	–	–	–	·5	3	–	4·5	10	25	–
Beans	–	–	–	–	5	260	–	265	900	554	850
Cashew-nuts ...	–	130	–	217	–	–	–	347	463	–	–
Cotton Lint 400 lb. bales	493	10	1,596	–	526	759	1,396	4,780	5,584	9,822	11,962
Cassava ...	183	374	102	–	701	26	–	1,386	259	1,400	1,400
Copra	870	1,538	839	2,201	–	–	–	5,448	4,638	5,161	3,992
Charcoal ...	–	1,269	–	–	–	–	–	1,269	1,155	–	–
Coffee	–	–	–	–	14	–	–	14	13	11	5
Gum Copal ...	11	16	–	–	–	–	–	27	65	81	–
Groundnuts ...	0·5	15	–	–	–	73	–	88·5	127	31	85
Maize	157	1,377	81	–	499	2,255	–	4,369	8,767	5,548	5,673
Kapok ...	–	–	–	–	70	25	–	95	66	102	–
Onions ...	–	–	–	–	150	18	–	168	129	110	100
Potatoes ...	–	–	–	–	9	8	–	17	55	265	207
Paddy ...	0·5	96	407	–	48	24	205	780	6,894	7,040	6,842
Hand-hulled rice	–	1·5	18	–	–	–	159	178·5	890	964	2,177
PULSES:											
Cowpea ...	9	24	–	–	36	12	–	81	224	565	228
Gram ...	2	59	6	–	2	–	–	69	7	–	–
Pigeon Pea...	17	65	30	–	2	–	–	114	153	–	–
Raffia	–	67	–	–	–	–	–	67	66	17	–
RUBBER:											
Plantation ...	–	27	–	–	147	–	–	319	245	93	–
Wild ...	–	2	–	–	–	–	–	2	37	49	–
Sesame ...	22	172	254	–	52	23	–	523	606	531	327
Sisal	–	5,000	260	–	12,600	13,125	–	33,985	31,717	26,808	26,000
Sorghum ...	–	191	183	–	128	10	–	512	2,725	965	1,861
Vegetables ...	–	–	–	–	324	400	–	724	665	600	450
Castor Seed ...	–	–	–	–	–	268	–	268	131	90	–
Jaggery ...	–	–	–	–	150	350	230	730	463	372	–

Annexure II

TOURING OF OFFICERS DURING 1945

	Nights out.	Days in Field.	
A. H. Savile, Senior Agricultural Officer ...	74	29	Absent on vacation leave since October.
C. J. M. Krige, Agricultural Officer ...	55	20	Transferred to Arusha from May to August.
R. B. Silcock, Agricultural Assistant ...	157	62	
A. A. E. Weirich, Senior Agricultural Assistant	66	46	Absent on vacation leave from June to October.
C. M. H. Sutherland, Agricultural Officer	128	82	Absent on two months' annual leave.
A. Taylor, Agricultural Assistant	21	19	Transferred to Morogoro since 1st August.
J. C. van Schoor, Agricultural Assistant ...	94	25	Absent on two months' annual leave.
J. M. van Dyk, Agricultural Assistant ...	67	39	Arrived on first appointment, 22nd June.
J. D. Hunter-Smith, Agricultural Officer ...	—	—	Arrived on first appointment, 2nd December.
R. G. Hoaran, Crop Supervisor	21	7	Arrived in mid-November.

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Dairy

During the year the average milk production per month was ... ... 2,650 lb.
Average quantity per month sold to customers ... ... 2,300 lb.
Average quantity of milk fed to calves ... ... 350 lb.

In order to maintain the dairy herd and work oxen on a care and maintenance basis paddocks were planted with Uba Cane, edible canna, kavirondo sorghum, *Panicum maximum* and *Pennisetum purpureum, Dolichos Lablab* and maize for silage. The only concentrate fed to the herd was cotton seed.

Root Crops

(a) *Cassava.*—A local variety of cassava, heavily infected with mosaic and "Dihanga", a mosaic resistant variety from Bagamoyo, was planted in February 1945, in adjacent rows for comparison. The varieties were harvested and weighed in February 1946, giving the following results :—

"Dihanga" : 2,580 plants ; ·62 acres ; yield 6,392 lb.
Local : 703 plants ; ·16 acres ; yield 703 lb.

Thus "Dihanga" showed a 56 per cent superiority in yield as compared with local. The commuted yields per acre were 4·6 tons Dihanga and 3·2 tons local.

The aim is to increase the stock of Dihanga this year and to multiply it in district plots throughout Morogoro.

Twelve varieties selected on the basis of resistance to mosaic and brown streak under Amani conditions were planted on 1st April 1945, and harvested on 6th March 1946. Each variety has been multiplied for further observation. Rows of mosaic infected varieties have been interplanted with the varieties under examination. A report on the cropping, palatability and general behaviour of these varieties has been forwarded to the Director at Amani.

(b) *Sweet Potatoes.*—The planting of Caroline Lea and a number of local varieties have been continued. Rhizomes of Caroline Lea and the Local varieties were distributed to Bigwa Training Centre, Kingolwira Prison and 400 African cultivators round Morogoro.

Nurseries

The following quantities of planting material were sold during the 1944-45 season :—

Citrus trees : 3,722 ; Assorted fruit trees : 1,462 ; Flowering plants : 1,344.

In the past few years the demand for budded citrus far exceeded the supply, with the result that it became necessary to close the citrus nursery from April 1945 to November 1946, while it was being reorganized and extended. It will be necessary to continue the extension of the nursery in order to meet the increased demand.

Orchard

In addition to supplying all householders in Morogoro with a bi-weekly delivery of fruit, 400 grapefruit per week at ten cents each delivered on the farm were sold to two local traders for a period of three months.

Training

Two Africans from the Southern Province, were given a four months' course in nursery work during the 1945-46 season.

Cereals

All grain crops were planted on blocks of land that had been under grass leys of *Panicum maximum* and *Pennisetum purpureum* for a period of three years. The advantages to be derived from the introduction of grass leys in a grain rotation are clearly demonstrated when maize yields on the farm are compared with average maize yields on non-native estates at Morogoro. In 1945 the average maize yield on the farm as compared with estimated average non-native yields on estates were 5 bags and 1·75 bags per acre respectively. The varieties of maize grown on the farm were Katumbili, Durum and Exteen.

Sorghums

Eight varieties, T. 9, T. 18, T. 15, K. 6, L. 1, L. 10, T. 29 and L. 26, of early maturing sorghums from Uganda (Serere) were planted on 15th December 1944, in observation plots. Under Uganda conditions these varieties took three to four months to mature and yielded crops of 1½ to 2 tons per acre.

Under Morogoro conditions two varieties, T.29 and L.26 failed completely ; the remaining varieties yielded very poorly and took four-and-a-half to five months to mature. All varieties began to sprout in the ear before harvesting was commenced at the end of April. Sufficient seed of each variety was obtained to continue the trial in the 1945-46 season. The varieties were not comparable in yield with two local medium maturing varieties Bangala and Karachi.

Mc K. Krige,
Acting Senior Agricultural Officer,
Eastern Province

ANNUAL REVIEW OF THE LAKE PROVINCE, 1945

Staff

(a) *European.*—Mr. N. V. Rounce, Senior Agricultural Officer, departed on leave to the United Kingdom on 7th May and was relieved by Mr. Allnutt, whose place as Agricultural Officer, Mwanza, was taken by Mr. Lunan. Mr. Rounce returned from leave on 7th January 1946.

Mr. Butler, Agricultural Officer and Ginneries Inspector, was absent on leave in the United Kingdom from 19th February 1945, and has not yet returned.

Mr. Thomas departed on leave to the United Kingdom on 6th April and was relieved by Mr. Jervis, until his return on 1st October.

Mr. Lunan relieved Mr. Allnutt at Mwanza from the 24th May till the end of the year.

There was no change in the staffing of the Musoma and Biharamulo districts, nor of the Ukiriguru school or farm.

Mr. Peat was relieved on his departure to the United Kingdom on leave by Mr. Prentice from 14th July to 31st December 1945.

Three Crop Supervisors complete the staff: Mr. Papacharalambous was transferred to Shinyanga from Mwanza during May, and Mr. von Freeden from Musoma to Nyamahona, Mwanza, in October. Mr. Maercks continued with his grading duties in Bukoba throughout the year.

It is clear from the above that there has been considerable shortage of staff and lack of continuity owing to staff taking very necessary spells of leave in the United Kingdom, and it is equally obvious that this state of affairs will continue throughout 1946.

(b) *African.*—Four African Agricultural Assistants trained at Makerere were posted in the Province, Messrs. Fundikira, Mwakosya, Ishengoma and Kapalaga. They have been stationed in Mwanza engaged in multifarious jobs, to give them experience before being posted to other areas in the Province.

The staff comprised seventeen Recorders on the Experimental Stations, seven Overseers, six Teachers and nine Clerks. There were ninety-three permanent Instructors and one hundred and five temporary men working for the department in the Province in 1945.

The Lubaga Farm has lost the services of an experienced old hand in the person of Sigara Mbapala, Overseer, who died in October after a long illness.

General

At the beginning of the planting season no district in the Province had any considerable reserves of food and one, Shinyanga, was expected to require relief fairly soon.

But the short rains opened early and planting conditions were very favourable during October and November, so that there seemed to be every prospect of the food position being quickly improved. In December rainfall was somewhat erratic, though reasonably adequate excepting at Shinyanga and Musoma, but thereafter a drought set in throughout the eastern half of the Province. The drought varied locally in length and intensity; much of Musoma experienced fifteen weeks of it; part of south-eastern Shinyanga had no

effective rain from the end of January till the end of May; other areas had fleeting respites. By the end of March all hopes of a bumper season had been displaced by anxiety in some districts and acute alarm in others that we should be faced with serious food shortages on a wide scale. But in mid-April the long rains broke—just about a month late—and fortunately they persisted for their normal duration and did not cease until early in June. They came too late to save the groundnut crop and much of the rice, and only just soon enough to allow the staple grains to mature a modest crop. Cotton, of which there was a big acreage, came through the climatic ups and downs fairly well, though yields did not come up to early expectations. The only bumper yield which can be recorded is that of the maize grown in the Kuria highlands of Musoma, where the seeding was done so late that, at the time, there was serious doubt whether the crop could be expected to mature at all if ordinary climatic conditions obtained. As it happened the rains continued far beyond their normal span and a record crop was reaped.

So far as food crops are concerned the net result of this season of climatic vagaries was a good harvest in Bukoba, Biharamulo and North Mara, a very fair one in Mwanza, tolerable in most parts of Kwimba, Maswa and Shinyanga and Kwimba and many parts of South Mara.

The output of the major cash crops, coffee and cotton, was very fair, but the prolonged drought had a serious effect on the paddy crop and depressed the output of groundnuts and sesame to almost negligible figures. The production of chick pea in Sukumaland was well maintained and in Biharamulo the production of fire-cured tobacco was a record. In Bukoba the sales of maize, soya beans and European potatoes all showed increases.

Taking the Province as a whole it can, therefore, be said that the season was a very fair one for cash crops but only passable for food crops.

Food Crops by Districts

Biharamulo experienced a very satisfactory season.

Bukoba experienced a similar year to 1944 which was said to have been one of the best years that can be remembered. The position has been maintained and exports increased.

Musoma.—After two difficult years, 1945 was even more difficult. Good light rains allowed of a better than average planting of roots. This was followed by seventeen weeks' drought as from mid-December 1944. The rains broke at the end of April just when it was feared they might fail completely; a food shortage in many areas was averted and an estimated over all 50 per cent harvest resulted after an abnormally late season.

Usukuma.—Tolerable returns were obtained for the most part. Good planting rains were followed by a long drought which reduced yields to subsistence levels in some areas.

Extracts from Agricultural Officers' Reports

(a) *Food Crops.*—In Bukoba bananas were plentiful throughout the year. Grass mulching of the coffee has permitted of the banana trash being left *in situ* as mulch, and in some cases grass mulch has been added. The better soil conditions, the careful upkeep of the bananas and the suitable weather this year, all combined to complete the recovery of this crop, which had been deteriorating for some years owing to competition from coffee, aggravated by droughts. There was a glut of cassava. Swamp cultivation of sweet potatoes

was discontinued, owing to sufficient supplies being obtained from the top lands. The area planted to Bambarra groundnuts was comparatively small owing to the tribal custom forbidding the planting of this crop in two chiefdoms following the deaths of the respective chiefs. Eleusine planting has been discontinued in most areas since the order to plant was revoked.

In Musoma the recovery of part of the eleusine crop in South Mara, Usimbiti and Girango after the prolonged drought averted a famine. In Kuria the main planting of eleusine waited until the second half of April and excellent crops were finally reaped. The bullrush millet crop once again proved its ability to give a crop in a minimum of time and with the minimum of rainfall, and it is a pity that this crop is not grown in more of the drier areas of the district. Sorghums were a failure in the mbuga areas where it is the main staple. In other areas the early planted long-term varieties were almost wiped out by the long drought and stalk-borer. With the late season, the short-term varieties, mainly strains of Dobbs, gave excellent yields and have become very popular. Five tons of Dobbs seed ex Ukiriguru were distributed in October 1945. Maize in Kuria was grown throughout a period which could normally only be expected to be a dryish period, and produced a record crop for the area estimated at at least 10,000 bags. The production of the Bakuria has grown from 1,000 bags in 1941/42 to over 10,000 bags in 1944/45. In most areas there was an excellent increase in total acreage of this crop. After very many warnings and the advent of a big famine even the Wanata and Waissenye planted sufficient cassava to provide abundant cuttings for the next year. Cultivators of Nguruimi and Bwassi consistently refuse to plant this crop, making them most vulnerable to famine and locust attack. During the long drought period mentioned before, cultivators within reach of the lake-shore strip were persuaded to clear papyrus and reclaim areas suitable for sweet potatoes; as the lake never rose more than a few inches some bumper crops were harvested, and assisted greatly in filling the gap between finishing the old grain and reaping the new.

Sound agricultural advice together with an ability to take stock and make the best of a situation are characteristic of the way in which the Agricultural Officer has handled the situation, which, without the saving grace of late rains, might have been much worse than it was.

In Mwanza the comparatively good food crops of the previous season tended to persuade the cultivators to concentrate more on cash crops. Large amounts of dried cassava were sold. The damage done by the January-March drought and heavy depredations by birds were compensated by May rains and the early September rains of the 1945/46 season.

In Shinyanga pressure was brought to bear for the planting of root crops, but the food reserve position can still not be considered as satisfactory, in particular as root planting is confined only to areas which are considered really suited to the crop.

(b) *Cash Crops.*—The Ngara coffee crop exceeded all previous years except 1944. The crop was 139 tons; this sudden increase of crop in the last two years is attributed to good seasons and some progress made in Antestia destruction. The new crop is expected to be even better.

In Biharamulo a record crop of 87 tons of dry tobacco was purchased by the Native Authority tobacco factory at Nyarambugu. Five and a half tons of this tobacco came from the Busubi Chiefdom, where tobacco growing was

started again. It is estimated that about 200 tons were sold by the growers privately. There was a good groundnut crop in Biharamulo but little has found its way to the markets.

In Bukoba 8,074 tons of coffee have been exported. This crop was obtained in spite of considerable loss by cherry fall, due to heavy rain in May. The maintenance of coffee trees in the field has improved this year. Special staff was again employed to insist on mulching of the fields, with success. 1,646 tons of maize were sold by the growers of which half was exported. Soya bean and European potato production has only shown a small increase. Potatoes have supplied the needs of the Province. Citrus and vegetable exports declined with the end of the war. Vegetable production will now be reduced to satisfy Bukoba's requirements alone. The Agricultural Officer reports that "cash crops other than coffee were successfully produced in exportable quantities during the last few years of the war due to the enforcement of the Defence Regulations and the danger of famine during these years. Less enthusiasm is already obvious as a result of the plentiful food supplies available to all this year and a reduction in cash crops can be expected in 1946".

In Musoma a crop of 1,971 bales of cotton was produced. On the very poor soils cotton was unable to stand up to the seventeen weeks' drought. On the better soils the plants took little harm, were remarkably free from pests and set an early but light, clean crop.

Before the May rain the plants were leafless and stunted. Thereafter a complete transformation took place, but this second setting suffered from stainers and much of the crop was left on the plants. Once again cotton has shown its value as a drought-resister. Groundnuts were a complete failure. Opportunity has been taken to push cotton as an alternative to groundnuts owing to the absence of seed in three chiefdoms which normally plant little. Sesame was also a failure. Paddy was not as good as 1944. The quality is also very bad and fresh seed has been imported for exchange with growers for their old seed. "As with groundnuts in Zanaki, so with rice in Majita", says the Agricultural Officer, "following three very poor rice years there has been a return to cotton and the Wajita have been advised to try both for a safe cash economy". He also remarks that: "much could be done by cultivators to improve the management of their paddy fields in Majita; most fields are completely open and in no way bunded. They are mostly sloping, with the result that yields are from nil to 100 per cent from the top to the bottom of the plot. No attempt is made to converse water at any point, and a lot of water runs into the lake uncontrolled."

There was an increased acreage of cotton in the Mwanza District and a production of 16,623 bales which has only been bettered three times since 1936. Moreover the return to the grower in cash exceeded that of any year since 1936. For the third year in succession much of the marginal rice land was left uncultivated, and some rice dams were used for growing other crops such as chick pea and sweet potatoes. There was an increase in acreage and production over 1944, but the crop is still below what the district can produce. The poor rains of January-March were the chief cause, but higher yields could be obtained if people followed our teaching about closer and more regular planting. The groundnut crop was again a failure, whilst sesame only amounted to 40 tons. The production of chick pea continued to rise, reaching 670 tons as

compared with 414 and 624 tons for the two previous years. The main producers are Urima and Msalala but the cultivation is spreading into other areas.

A good average crop of cotton was produced in Shinyanga amounting to 4,350 bales. Rice and groundnuts were again a failure. Chick pea did not rise to expectations.

(c) *Soil Conservation Measures.*—In Biharamulo there is some progress to record as regards the ridging of root crops, most of which are now planted on the ridge.

In Bugufi great perseverance is needed, for contour ridges are broken down every year. Contour hedging is even more unpopular and very difficult to maintain, but it has survived better than the ridges.

In Bukoba a certain amount of propaganda was done but with little success. Compulsion is needed.

In Musoma a steady programme of soil conservation measures was followed throughout the year. With the exception of Ikizu, Majita and parts of Kuria it cannot be said that much progress has been made. The most spectacular results are with tie-ridging in Ikizu where owing to the splendid co-operation of the Chief (who was recently rewarded with the King's Medal), it is difficult to find any fields which are not efficiently tied. What is more important, cultivators agree that their crops are yielding better, springs are being resuscitated and run-off checked. A demonstration of contour ridges across the large "long down the slope" eleusine fields of Zanaki, Ewassi and Nguruimi was a failure. Grass strips as stop-washes are now being tried. From grass strips, strip-cropping in the accepted sense, is but a near step, well suited to the more densely cultivated and stocked areas of Kuria. As regards ploughing up and down hill there has been a marked improvement.

In Usukuma generally soil conservation measures have been pressed, together with others for the maintenance of soil fertility.

(d) *Water Conservation.*—A scheme for the reclamation of land for settlement, by the provision of improved water supplies is now being investigated in the Bukoba District. It is hoped that, should the proposals be possible of implementation, the acute land shortage in the coastal belt will be eased.

In Musoma, water conservation has been a very important feature of the Agricultural Officer's work. The Mori River had insufficient water during the drought to supply the furrow until the end of April. The flow was again too small in mid-December. The dam which was built at the end of the furrow maintained enough water for stock, however, throughout the year. Nine dams of various sizes were constructed in North Mara, due almost entirely to the maintained efforts of the District Officer. In South Mara seventeen dams were built, of which six were constructed by the Native Authority of Nguruimi assisted by the Crop Supervisor. Some are intended for domestic use and others for stock. Of all these dams only the experimental one at Bweregi failed to hold water. These dams have proved popular with the people and we now have more requests than we can cope with for advice resiting and assistance to build.

In Mwanza dam-building has been mainly confined to Karumo where the Crop Supervisor has organized the building of four dams.

(e) *Expansion Areas: Musoma.*—Clearing of the Suguti Valley continued under the supervision of the Tsetse Department, and some useful country was opened up. Resettlement is not proceeding at a quick enough rate to keep pace with regeneration however. The clearing of this area will assist the over crowded Majita Peninsula once the people can be persuaded to move. Clearing of some impenetrable thickets on abandoned homesteads in four chiefdoms in the Ruwana Valley plains, resulted in a fall in the numbers of tsetse fly.

In Mwanza the absence of a European at Nyamahona for a large part of the year resulted in a certain amount of unauthorized movement into closed areas. The people in the Nyamahona settlement continue to be prosperous. Some progress has been made towards the goal of one acre of trees per holding. The African Agricultural Assistants have been examining the position in both Uzinza and Ukerewe, and action is being taken where there is over-crowding. In Ukerewe their survey demonstrated that all the coastal villages were either sufficiently populated or over-populated, but that there was still more room in the inland villages. The former were closed but there has been some unauthorized movement all the same.

A useful check on the movement of populations is being made in Shinyanga District.

In Maswa work on dam building has proceeded under the direction of the District Commissioner.

(f) *Social Welfare.*—There are eight village schools in the Bukumbi Chiefdom of Mwanza District, which are maintained by the proceeds from communal cotton plots. The Government Inspector of Schools is interested in this type of school and hopes to assist with staff later on.

The Kaya School at Lubaga has been closed down, having served its purpose and demonstrated quite successfully the value of bringing traditional "family teaching" into the school with a maximum of agricultural pursuits, though at a cost—being a boarding school—too high for general introduction to the Province.

(g) *Training of Agricultural Instructors.*—Many changes have taken place in the management of the school. Early in the year it was decided to divide the classes up into two in order to avoid the holding back of higher standard pupils by the backwardness of their lower standard colleagues. This entailed turning the dormitories into class-rooms and vice versa. A number of teachers have come and gone and the greater number are now ex-pupils of the school. The curriculum was made a little less stereotyped and more licence was given to teachers to drill a subject home rather than just finish the lesson according to plan. Later in the year the new arrangements were adopted into the course, that is a three-year course of forty pupils per year, one hundred and twenty pupils in all. At the end of the year there were seventy pupils in residence. New plans for salaries for students were thrashed out and pupils are now paid whilst receiving instruction according to a scale. Shs. 15/- per mensem is deducted for board and lodging. As a result there has been considerable improvement in the educational standard of pupils entering the school.

The Native Authority side of the school was taken over by the Government in agreement with the Administration. Plans for new buildings were drawn up by an architect, as the existing temporary buildings will only hold seventy pupils, and there are not enough facilities to run so big a school efficiently. The importance of the practical side of the teaching is not underestimated

and this feature is being concentrated on, not without difficulty. Thirty pupils passed out of the school and five more failed or were dismissed. They passed out as follows: Very highly recommended 2; Highly recommended 8; Recommended 13; Recommended for trial only 7; Failed 3.

The Agricultural Officer, Mwanza, assisted by the staff of the school and Mr. Fundikira, African Agricultural Assistant, held a three-week refresher course in August for thirty of the less well-educated instructors of the four Sukumaland districts. Classes were held in Cultivation methods, Botany and Crops, Arithmetic, Soils and Fertility, Pests and Diseases and Elementary Surveying. The course was a success and greatly appreciated by the Instructors.

(h) *Pests and Diseases.*—In Bugufi the cultivation of pyrethrum for use against Antestia has not been a success, and a consignment of dust is on order from Kenya. In the meantime considerable success has been obtained with the smoking-out method demonstrated by Mr. Jervis.

Tobacco leaf virus was bad in Biharamulo both in plots planted for two years or more and on ratooned plants.

In Bukoba, European potatoes continued to be free from blight. The only record of Brown Streak on cassava in this Province is from Karagwe, so that cassava strains bred at Amani and resistant to Mosaic but probably carrying Brown Streak have been introduced to Karagwe for trial.

The virus disease originally reported from Biharamulo on sweet potatoes was found to be the Stem disease, but virus disease was also found and is present in most parts of the Lake Province.

Tortoise Beetles did considerable damage defoliating sweet potatoes at Majita in Musoma. Stem Eel Worm was recorded in Dobbs sorghum at Tarime. In some parts of south Nyanza in Mwanza District a plague of birds, the worst in living memory, severely depleted the grain harvest. Four Native Authority Vermin poisoners have been at work throughout the year in Mwanza District. The poisoning is most effective against porcupine.

(i) *District Experimental and Demonstrational Work.*—The "Good and Bad Farmers" plots were again a feature at the various Chiefs' headquarters in the Shinyanga District. The natural regeneration plots have begun to show some interesting differences. They are sited on almost all the types of soil cultivated in this district. The object is to make observations on natural regeneration of vegetation under grazed and protected conditions.

At Nyamahona Farm in Mwanza District the grazing observation plots provided more grazing than last year. The block on the lighter soil (Luseni) had a capacity of one and a half beasts per acre under rotational grazing. On the heavier not so well drained soil (Itogoro) the capacity was over one beast per acre. The cattle remained in fair condition all through the dry season. These figures compare very favourably with those of under one acre per beast and one and a half acre per beast respectively for the dry year of 1944.

The cattle bedding experiments to ascertain the amount of manure procurable from bedding with (a) elephant grass (b) field residues, were continued. So far it appears that between $1\frac{1}{4}$ and 2 tons can be provided by either method, depending on the season. At Nyamahona Farm forty-five acres were under cultivation providing seed for distribution. The eight varieties of cassava introduced from Amani are all showing marked resistance to Mosaic bombardment.

Experiments at Mwabagole have shown that Kilombero Afaa rice is better yielder than Maji-Maji in the same category for quality. Unfortunately as paddy however it could not be distinguished from the true Afaa in the high quality category, which would damage the market for the latter. Another variety called Kahogo, however, is of much the same quality as true Afaa, and has a distinguishable red husk.

A quadrat survey was therefore conducted in cultivators' fields where the two varieties Afaa and Kahogo were near together in order to ascertain quickly and in support of experiments to be conducted in 1946, whether in fact Kahogo was as good, if not a better yielder than Afaa. Kahogo was found to be not quite significantly better than Afaa. This work was in the charge of the African Agricultural Assistants.

(j) *Grading.*—Mr. Allnutt instituted a simpler method of grading tobacco in Biharamulo, cutting down the classes from 98 to 25, with a provision next season to cut them down to 10 classes only. This will help to speed up the work.

As regards coffee grading the Agricultural Officer, Bukoba, remarks: "There were no difficulties with coffee grading. Rejections increased by 8 per cent, 38 per cent of the coffee offered was rejected. This figures does not indicate the quality of the coffee offered. It is common practice for merchants to re-offer rejected coffee several times in the hope that some of the consignment will be accepted. Until such time as a heavy penalty is introduced for rejected coffee, or the coffee bulked, this practice will continue."

(k) *Marketing.*—The Bukoba Coffee Control Board made a profit of Shs. 828,000/- and commenced the year 1946 with a balance of Shs. 299,555/-, having paid Shs. 1,000,000/- to the Agricultural Development Fund. The marketing of the Bukoba citrus, vegetables, maize and soya beans proceeded smoothly through the different organizations.

(l) *Forestry.*—The Agricultural Officer, Mwanza, continued to exercise general supervision over the native staff of the Forest Department engaged on protection work and revenue collection. The planting of plots of *Cassia siamea* in each gunguli in the Nyanza and Usega Federations continued.

A Native Authority Instructor continues to demarcate reserves for fuel and building materials in Uzinza. Two trained Forest Guards were recruited from Tabora and paid by the Shinyanga Native Authority to close hill-top areas and supervise the tree lines in the Ibushi areas of south-east Usiha.

(m) *Implements.*—There is a big unsatisfied demand for ploughs in Musoma District. Tools generally were in very short supply. Forty maize shellers, ten Atlas mills and twenty-one harrow sections were sold in that district in 1945.

(n) *Crop Surveys.*—Material from Bukoba, Musoma and the Sukumaland districts was collected.

A very comprehensive survey of one-per-cent of the home-steads in the Mwanza, Maswa, Kwimba and Shinyanga districts was undertaken and the results will be forwarded later when complete. The survey was organized by Mr. Allnutt, with the help of Mr. Luman and the African Agricultural Assistants and Instructors and certain staff specially employed for the purpose. Useful information was obtained of the relative productive capacity of the various soils, the percentage of these soils cultivated in the different chiefdoms,

the acreage cultivated per homestead of different crops, which will be of considerable value in assessing the actual densities of stock and humans, and the optimum densities of both.

Crop surveys of four chiefdoms in the Musoma District were provided by the Agricultural Officer assisted by the Crop Supervisor. A considerable amount of data is being collected and it now remains to get a proper picture of the whole by studying the material and setting it out on development maps.

(o) *Experimental Stations.*—Work and results of note during the year may be briefly summarized :—

(a) Tie-ridging the unpopular hard pan soil "ibambasi" gave just double the yield of seed-cotton planted on the flat. Similarly with sorghum, though the yields could only be measured in terms of straw.

(b) Five oxen penned at night only, for a period of two months, produced compost at the rate of 17½ tons per beast per year, using as much bedding from farm wastes as would break down.

(c) Yields from manurial trials showed increases of much the same quantity as in previous years, that is 25 per cent to 35 per cent.

(d) After three years of various resting crops mixed sorghum millet gave increases over control (continuous grain) of 20 per cent after *Hyparrhenia dissoluta* grass, 34 per cent after *Cynodon* grass, 38 per cent after Elephant grass, and 45 per cent after Pigeon Pea. The results of the tests by Dr. Martin of Uganda on the soil from the plots did not show, however, that this increase was due to an improvement in soil crumb structure.

(e) The collections of grasses at both Lubaga and Ukiriguru continue to indicate the potentialities of *Cenchrus ciliaris* whilst at the latter station *Brachiaria brizantha* is showing up well.

The break down of the pump engine at Mwabagole has precluded much work being done on rice. A full report on the two stations is published in the *Empire Cotton Growing Review*. The above brief remarks only give the highlights of the season.

(p) *African Income.*—Figures were collected by Agricultural Officers from statistics of the average income of Africans for the four years 1942-45. The figures arrived at were as follows :—

District	Average income per peasant taxpayer from agricultural pursuits Shs.	Average income all taxpayers all pursuits Shs.
Musoma	38 ...	55
Shinyanga	48 ...	62
Bukoba	72 ...	92
Ngara	38 ...	41
Mwanza	65 ...	67

Income subject to deduction of cost of staple foods purchased.

Conclusion

The year saw the beginning of the long-awaited scheme for a team of officers to run the development and rehabilitation programmes of the Province. The idea was facilitated by the approval of the federation of the Sukumaland Chiefdoms into one big unit, with headquarters at Malyaluguru, ten miles north

of Malampaka Station. This place will also be the headquarters of the proposed team, and plans were being made in 1945 for the augmenting of the water supply and the siting of the houses.

A plan for land utilization in Sukuma (for the first three years of limited staff) with a description of the long-term objectives, was approved by the Director. So far we have only been able to make a start with the gathering of information on the lines outlined in Section 4 (n) of this report, and, of course, the enlargement and re-organization of the Instructors' school.

I am not in a position to make a long record of conclusions owing to my absence from the Province for the greater part of the year, but suffice it to say that the aim has continued to be, and will be, "better farming", and when all the staff has had much needed leave, and additional staff has been made available, then we shall hope to have information and plans ready for an extended effort to rehabilitate and develop this Province.

In conclusion I would like to thank the officers of the Administration for their ready and continuous help and interest in matters agricultural, and the officers of the Empire Cotton Growing Corporation attached to this Province who have as always, stepped into the breach, when absence of staff necessitated it, to assist us in the district.

N. V. ROUNCE,
Senior Agricultural Officer,
Lake Province

Mwanza,
26th January 1946

Annexure I

COTTON LINT PRODUCTION FOR 1945 SEASON
(In bales of 400 lb.)

Ginnery	AR. Bales	BR. Bales	AR. and BR. Total Bales
Malampaka ...	2,900	133	3,033
Luguru ...	2,257	211	2,468
Bukumbi ...	1,346	71	1,417
Nyambiti ...	3,394	126	3,520
Murutunguru	3,883	152	4,035
Ihale	1,851	51	1,902
Mwanza ...	2,439	33	2,472
Pambani ...	2,816	265	3,081
Nassa ...	3,595	219	3,814
Buchosa ...	2,910	73	2,983
Mugango ...	1,786	277	2,063
Usogore ...	4,167	423	4,590
	33,344	2,034	35,378

PRODUCE MARKET RETURN—LAKE PROVINCE
JANUARY TO DECEMBER 1945 INCLUSIVE

Annexure II

(In short tons).

District	Paddy	Value £	Ground-nuts	Value £	Sesame	Value £	Grains	Value £	Chick-pea	Value £	Gum	Value £
Bukoba	–	–	–	–	–	–	1,924	8,696	*388½	–	–	–
Musoma	356	1,503½	18½	171½	14¼	92½	1,028¼	4.195	–	–	–	–
Mwanza	3,263¾	17,733	56¾	569	39	318	3,070	13,825	666¾	9,585	–	–
Kwimba	897½	4,644	265	2,640	4¼	32½	–	–	378	6,134½	131½	6.032
Maswa	–	–	15	152½	1½	16½	–	–	¾	9½	2	37½
Shinyanga	72½	441	104½	1,112	¾	6	112	743	48½	726½	235	11,025½
Grand Total ...	4,589¾	24,321½	459¾	4,645	55¾	465½	6,134¼	27,459	*388½ 1,094	16,455½	368½	17,095

*Soya Beans.

TABLE OF COFFEE EXPORTS FROM BUKOBA (in tons)

Annexure III

Month	ARABICA						ROBUSTA					
	1940	1941	1942	1943	1944	1945	1940	1941	1942	1943	1944	1945
January	66·39	44·73	143·70	75·00	125·00	240·48	139·68	158·76	247·50	385·00	225·00	355·71
February	52·51	91·31	84·15	15·00	40·00	165·33	93·28	202·44	215·46	155·00	110·15	218·37
March	124·02	131·50	44·55	15·00	30·00	60·12	54·45	142·13	147·60	90·00	50·00	165·33
April...	259·47	94·05	84·15	70·00	47·29	120·24	87·42	84·86	70·61	40·00	36·57	50·10
May	408·17	148·50	297·00	145·00	190·00	200·40	316·10	333·39	108·13	60·00	45·00	50·10
June	381·70	397·25	675·30	320·00	855·00	360·72	775·51	716·80	554·41	200·00	140·00	204·41
July	213·78	544·67	479·82	300·00	985·02	415·83	545·04	1,111·69	1,080·23	930·00	640·00	1,002·00
August	205·25	348·82	330·33	230·00	705·00	152·54	1,058·47	787·05	1,067·68	965·00	1 ,425·	1,427·85
September	126·07	196·95	145·00	130·00	460·02	75·15	922·73	492·57	800·00	615·00	1 ,240·	926·77
October	272·88	120·92	250·00	165·00	120·00	119·21	663·41	181·46	455·00	485·00	310·00	764·89
November	158·58	78·14	171·99	150·00	270·54	140·00	564·41	94.48	278·87	275·00	781·56	545·00
December	61·86	80·97	140·00	40·00	160·00	85·00	249·13	113·35	200·00	145·00	431·00	260·00
	2,335·68	2,277·81	2,845·99	1,655·00	3,987·87	2,135·02	5,661·43	4,418·98	5,225·49	4,345·00	5,434·28	5,970 53

ANNUAL REVIEW OF THE NORTHERN PROVINCE FOR 1945

Staff

Agricultural affairs in the Northern Province were in charge of the following Senior Agricultural Officers during the year :—

Mr. D. Sturdy, O.B.E., 1st January to 7th April.
Mr. F. R. Sanders, 8th April to 11th December.
Mr. J. V. R. Brown, 12th December to 31st December.

Staff changes took place also in the Arusha District where three Agricultural Officers held office for varying periods as detailed below :—

Mr. F. R. Sanders, January to May.
Mr. C. J. M. Krige, May to August.
Mr. T. C. Cairns, August to December.

In the Moshi District, Mr. R. J. M. Swynnerton, M.C., Agricultural Officer, remained in charge throughout the year.

Agricultural work in the Mbulu District was in charge of Mr. D. Shepstone, Agricultural Assistant, from 1st January until 23rd November when Mr. H. L. Brett, Agricultural Officer, took over. Additional assistance was given by Mr. A. Taylor, Agricultural Assistant, from 20th March to 26th April and by Mr. M. Zikakis, Crop Supervisor, from 1st April until 30th September.

African Agricultural Instructors, excluding Native Administration Instructors, were employed in the Province as follows :—

	Local Civil Service	War Production Staff	Total
Moshi	19	27	46
Arusha	11	14	25
Masai (Loliondo) ...	1	—	1
Mbulu	10	5	15
	41	46	87

Weather

The following notes on weather conditions are extracted from district reports :—

Arusha.—"The rains, which fell from October to December, 1944, were exceptionally heavy and protracted. From January till the end of May adequate rain fell in most areas, with intervening dry spells. The Western areas of Ol Donyo Sambu and Ngare Nanyuki have, however, experienced two dry years in succession, and crops, except at high altitudes, have suffered in consequence. Before the onset of the short rains in mid-November, conditions everywhere were dry. During December practically no rain fell, and the weather was exceptionally hot."

Moshi.—"Excellent short rains were experienced at the end of 1944. Good rain was experienced at the end of February west of Moshi, at the end of March throughout the District and from the latter half of April onwards,

with 25 day droughts in between, but in each case rain came in time to save the maize crop. From the end of May very dry weather ensued until November when good short rains commenced, only to be cut short again in December. The total rainfall for the year was 22·98 inches as compared with the average of 41·44 inches."

Mbulu.—"The year has been a poor one for rainfall; the rains commenced well in November 1944, but later, from January to May 1945, the rainfall was the lowest on record. The total rainfall from 1st August 1944 to 31st July 1945 was 27·58 inches against an average over twelve years of 31·39 inches. Rainfall from 1st August 1945 to 31st December 1945 has been 3·85 inches. These are recordings at Mbulu Boma. Average over twelve years August-December 9·37 inches. Although sufficient rain has fallen for planting food crops in December a good deal is likely to have to be replanted on account of a long dry spell in the latter half of the month."

Rainfall—November 1944 to October 1945

	Moshi (Av. 34 yrs.)		Arusha (Av. 22 yrs.)		Mbulu (Av. 25 yrs.)	
November ...	3·92	2·52	9·89	4·91	6·98	3·24
December ...	4·27	2·10	7·00	3·84	5·23	4·57
January	0·72	1·41	1·63	3·34	2·24	4·13
February	0·58	2·06	5·22	2·47	3·95	3·41
March	4·04	4·67	10·10	8·03	1·64	6·09
April	4·21	14·10	10·28	12·64	2·41	6·35
May	8·90	9·25	13·27	8·21	3·14	2·47
June	0·31	1·56	0·64	1·49	0·21	0·19
July	0·97	1·01	0·93	0·48	0·01	0·04
August	0·63	0·74	0·29	0·68	0·00	0·09
September ...	0·07	0·59	1·00	0·74	0·00	0·17
October	0·01	1·05	0·00	1·47	0·00	0·74
	26·63	41·06	60·25	47·30	25·81	31·49

General

Food Supplies.—Although some areas suffered from shortage of food, supplies on the whole have been adequate. Poor rains in the Mbulu District during the first quarter of the year resulted in reduced food crop production, but the situation was alleviated by increased swamp and valley-bottom cultivation and at the end of the year there was no actual shortage. Conditions deteriorated, however, in early 1946 owing to poor rains and at the time of writing it appears certain that food will have to be imported. Elsewhere the only shortage to be reported occurred in the Himo area of the Moshi District where, however, food was readily obtainable from the adjacent mountain areas.

While weather conditions and shortage of labour combined to make the year a difficult one from the farming point of view, crop yields generally were good and in some cases high production records were established.

Record crops of pyrethrum, papain and maize, both estate and native were obtained; a native coffee crop in the Moshi District was up to average. Although the coffee crop in the Arusha District was a poor one cereal production was better than usual and the district was not only in a position to supply its own requirements of maize, but even produced a considerable surplus for export.

Labour.—Labour was again an acute problem in 1945 and, had it not been for the supply of recruited labour from the Central Province, production programmes could not have been carried out. Local labour was again scarce, but as money was plentiful and trade goods few there was consequently little inducement for them to turn out.

Crop Production

Coffee: Arusha.—The Agricultural Officer reports as follows: "Although the prospects for the year 1945 were said to be good, the crop did not come up to expectations. There can be no doubt that the lowered standard of cultivation during the war years, the competition with other crops such as papain, and the difficulty of obtaining labour, which, when it does work, is less effective than formerly—has all had an adverse effect on coffee production. The price secured by the planter is good, and compares favourably with that prevailing before and during the early stages of the war, but a great deal of work will have to be done to get the plantations back into good working order again. The future of the industry will largely depend on how successfully the planters apply the knowledge which has been gained at the Coffee Research Station, as the prospects of a guaranteed price which should give a fair return for the effort expended seems likely to prevail during the next few years. A good deal of capital expenditure will be necessary to renew worn-out machinery and plant, to restore soil fertility and to replant with better coffee trees, but the prospects for the industry are much better than they were some years ago, particularly where coffee growing can be combined with some other activity such as dairying or seed growing.

The native crop sold amounted to 94 tons, the Arusha crop being 39 tons and the Meru crop 54 tons. Generally speaking, the native coffee has been better looked after than plantation coffee during the war years. The quality on the whole was good, and it is notable that the Waarusha have now reached almost as high a standard as the Wameru.

Pest Control measures have been hampered by lack of pyrethrum to control antestia, and staff to supervise and inspect plantations, but as far as possible routine measures were carried out.

A very heavy flush of flowers followed the November rains in the lower areas, and if weather and other conditions remain favourable, the coming season will be a good one."

Moshi.—The Kilimanjaro crop is reported on by the Agricultural Officer, Moshi, in the following terms: "The 1944/45 native coffee crop at 3,962 tons of parchment coffee only fell short of the 1940/41 record by 100 tons and the 1945/46 crop now being harvested will fall little short of 3,200 tons which is the average for the past seven years. The value of the 1944/45 crop was £305,074 f.o.r. Moshi. At Shs. 62/72 per cwt. to the grower after deduction of all costs this put £248,496 in the pockets of the Chagga coffee growers, of whom there are some 28,000. Besides his income from maize, onions and smaller crop sales, each coffee grower received on an average Shs. 176/00 from his coffee."

As regards quality the Valuation Committee of the Ministry of Food reported on the 1944/45 Kilimanjaro Native Co-operative Union shipments as follows: "The improvement in quality noticed last season has been maintained in this season's (1944/45) deliveries, size and colour have been good and defective

and foxy beans have been less noticeable; some of the later deliveries fell off slightly in colour. Cupping qualities of the earlier deliveries have been good but thin, whilst later deliveries possessed a sourish taste.

Preliminary reports on the quality of the 1945/46 crop indicate that after the early crop, the bulk of which comes from Rombo, there has been an improvement in quality and that it will turn out to be much the same quality as the previous season.

The estate crop for the 1944/45 season amounted to about 1,200 tons of parchment coffee and for 1945/46 will be slightly larger at 1,500 tons. The Valuation Committee of the Ministry of Food reported on the 1944/45 planters' crop that: "We find deliveries of this coffee to be preferable to the previous years, both in grading and colour. Quality was fairly well maintained although cupping results were rather thin; a few later deliveries fell off in colour and proved slightly sourish in cup."

The following table shows the total exports of coffee (native as well as non-native), expressed as tons of parchment coffee, from the Northern Province coffee-growing areas during the past five years:—

	1941	1942	1943	1944/45	1945/46
Arusha-Mbulu ...	3,578	2,817	1,331	1,729	1,535
Moshi	4,223	3,403	3,494	4,913	4,653
Total ...	7,801	6,220	4,825	6,642	6,188

The exports of native and non-native grown coffees, separately, were as follows:—

	1941	1942	1943	1944/45	1945/46
Native:					
Arusha-Mbulu ...	99	133	73	198	94
Moshi	2,120	2,686	2,506	3,886	3,102
Total ...	2,219	2,819	2,579	4,084	3,196
Non-Native:					
Arusha-Mbulu ...	3,479	2,684	1,258	1,531	1,441
Moshi	2,103	717	988	1,027	1,551
Total ...	5,582	3,401	2,246	2,558	2,992

Moshi Native Coffee Board.—The following is extracted from the report of the Agricultural Officer, Moshi: "As the result of proposals put up by the Moshi Native Coffee Board to Government at the beginning of the year, a graduated levy on the native coffee crop has been approved, which will bring in about £30,000 a year, so long as the contract with the Ministry of Supply lasts, to a fund administered by the Moshi Coffee Board. This has enabled the Board to engage Mr. A. L. B. Bennett as Executive Officer and to draw up an ambitious programme for the improvement of cultivation and marketing of coffee over the next five years. There are indications that the Ministry of Supply may extend their contract until 1952 which would be of great benefit to the Chagga with their uncertain pre-war markets. The main lines of improvement envisaged are the replacement of all unthrifty coffee by clonal selections from Lyamungu proved strains, by conversion from single to multiple stem pruning of coffee, by improved cultural methods and by improvement in the preparation of coffee.

The Moshi Native Coffee Board has now taken over all the coffee inspectors from the Kilimanjaro Native Co-operative Union in order to tighten up the control of the borer and antestia pests and to improve the state of cultivation

and preparation of coffee and it has taken over twenty-five Instructors from the Agricultural Department for the purpose of demonstrating the multiple stem system of pruning coffee, which has proved so successful at the Coffee Research Station, Lyamungu. Instructors attended courses at the Coffee Research Station for three months. By the end of the year some four hundred demonstrations had been laid down on native coffee plots and more were being laid down where coffee picking was late."

Wheat.—District reports give the following information :—

Arusha.—"The plantation wheat lands cultivated during 1945 were very similar to those planted in the previous year. Average results were obtained in the Ol Motonyi area and at Ol Joro, but at Lesheni the crop was poor, as practically no rain fell after the crop was planted. The Ngare Nanyuki crop was disappointing and Ol Donyo Sambu produced little or nothing. A small acreage was grown at Lower Usa.

The Native crop was again produced, mainly from the Ol Motonyi basin and towards Monduli. The crop was marketed through the agency of the Kenya Farmers' Association and was on the whole of good quality. Threshing was done as in the previous year.

The whole of the Northern Province wheat crop was sold through the agency of the Kenya Farmers' Association, but as in the past, difficulty has been experienced with the payment made for the crop; the Northern Province Wheat Growers' Association were appointed sub-agents. The guaranteed price of Shs. 27/50 per bag of first grade wheat was retained. The price of native grown wheat of good quality was again fixed at Shs. 25/- a bag."

Moshi.—"Wheat production for the year has amounted to about 700 tons excluding the Wheat Scheme and has mostly been produced by the Ngare Nairobi farmers, the main native area, Kibongoto, having concentrated this year on maize, for which they find a profitable black market among the Masai."

Mbulu.—"Wheat production cannot be assessed accurately as some has been used as food. Exported wheat (native) amounted to 3,772 bags—say 336 tons for the year."

Sales in tons as recorded by the Kenya Farmers' Association over the past five years are as follows :—

Non-Native:	1941	1942	1943	1944	1945
Arusha and Mbulu ...	1,591	1,900	2,033	3,216	2,067
Moshi	108	320	298	658	482
	1,699	2,220	2,331	3,874	2,549
Native:					
Arusha	300	600	448	642	387
Moshi	83	180	219	49	9
Mbulu	—	—	224	136	343
	2,082	3,000	3,222	4,701	3,288

Northern Province Wheat Scheme.—Notwithstanding adverse weather conditions and a heavy incidence of disease and pests, the Northern Province Wheat Scheme had an overall average of 3·41 bags per acre as against 2·15 in 1944.

The harvest, amounting to 75,208 bags, was obtained from 22,028 acres, of which 1,000 acres failed to yield a crop.

The results from the three areas operated by this Scheme were as follows :—

	Total crop bags	Acres sown	Overall average 1945	Overall average 1944
Ardai	43,207	14,963	2·89	1·45
Mbulumbulu ...	17,616	3,742	4·71	3·38
Ngare-Nairobi ...	14,385	3,323	4·33	3·88

The Ardai crop suffered from very dry conditions, particularly at the end of March and during most of April; aphis were very prevalent while grasshoppers defoliated some 300 acres and both stem and leaf rust caused very serious damage.

Rainfall was up to average at Mbulumbulu but the distribution was bad. Here 100 acres were so badly eaten out by locusts that they had to be replanted, while stem rust caused very considerable damage throughout the area. The best yield was 11·86 bags per acre from 110 acres.

At Ngare Nairobi weather conditions were unfavourable and yields were seriously depressed by a heavy attack of leaf rust. Amongst the best yields was that of a 10·2 bag per acre average over 386 acres.

Rye.—Uncertain prices and marketing difficulties in the past have resulted in the complete disappearance of rye from the Province. This is a matter for regret as the crop found a valuable niche in native agriculture and under local conditions is a more reliable crop than wheat, as well as being harder and a heavier yielder.

Maize.—Although the crop in the Moshi District was in a precarious condition at times owing to prolonged dry periods it managed to survive, and produced a record harvest. Cloudy weather from June to September led to late ripening and drying so that the crop came on the market rather later than usual.

Conditions in the Arusha area were more favourable and yields of early planted plantation and native maize were up to and above average. The Agricultural Officer writes "The free grant of Shs. 7/50 an acre for areas of 25 acres and over was continued, and this, combined with the guaranteed minimum price of Shs. 13/- per bag f.o.r. sender's station, greatly encouraged production. It is, however, generally stated that, owing to the high cost of production, maize-growing does not pay, even when a yield of eight bags per acre or more is secured, unless the acreage cultivated is very large.

A rough estimate of the crop for sale or for use on plantations, exclusive of that grown by natives for their own consumption is given at 25,000 bags. Of this, it is estimated that 20,000 bags are required for local consumption, leaving a balance of 5,000 bags for export. Although this is considerably below the average export surplus up to 1940, it is a great improvement on the previous year, when maize had to be imported. At the end of the season farmers who wished to dispose of their surplus were faced with an acute shortage of storage space, both on their farms and in town."

Approximate figures of the sales of surplus maize up to the end of the year are as undernoted :—

District	Non-Native Bags	Native Bags	Total Bags
Moshi	59,863	21,265	81,128
Arusha	16,320	4,553	20,873
	76,183	25,818	102,001

The Moshi figure of non-native production includes 3,535 bags purchased from Asians.

Pyrethrum.—Of the crop in the Arusha District, the only area of the Province in which pyrethrum is grown, the Agricultural Officer writes: "Production has been practically doubled and yields in the better areas do not appear to be diminishing. Considerable losses were experienced during the periods of heavy flushes, particularly at Olkokola in October, owing to the shortage of labour. With a few exceptions little is being done to improve methods of cultivation and drying and the fuel problem is still unsolved. Growers have signified their approval of merging their interests with the Kenya producers and negotiations to put this into effect are proceeding. The crop was all marketed in Kenya and the Kenya Farmer's Association were again the agents. Towards the end of the year the restrictions on the sale of the crop, other than to the agents, was removed and pyrethrum powder for insecticidal purposes is again being manufactured."

Total exports amounted to 358 tons, which, at Shs. 1/- per lb. represents a sum of over £40,000 to the producers.

Papain.—In spite of the restriction imposed on the planting of pawpaws, production has continued to expand throughout the Northern Province. All applications to plant or replant were in the first instance referred to the District Production Committees before submission to the Director of Agricultural Production. Although numerous applications to plant new areas were received permission was limited to replacement and to new plantings not exceeding 30 acres in any one year.

Production amounted to some 49 tons, of which 21 tons were produced in the Moshi District and 28 tons in the Arusha District. The average price during the year was roughly Shs. 9/- per lb.

Sisal.—The following table shows the export tonnage of sisal from the Northern Province during the past five years:—

District	1941	1942	1943	1944	1945
Arusha	2,323	2,539	2,640	2,191	2,649
Moshi	1,279	1,879	1,738	2,669	2,875
	3,602	4,418	4,378	4,860	5,524

Sugar.—Production at the Tanganyika Planting Company's Arusha Chini Estate amounted to 6,854 tons of refined and 450 tons of unrefined sugar, a total of 7,304 tons, some 400 tons less than the 1944 output.

The melolonthid beetle, *Cochliotis melolonthoides*, is still causing damage to cane on this estate and in addition the Company is now faced with soil troubles caused by concentration of salts, mainly chlorides and sulphates of magnesium, which seem to be responsible for the increasing infertility reported from time to time.

Seed Beans.—The Agricultural Officer, Arusha, writes: "The seed bean industry has had another good year, although labour shortages at one time threatened the growers with severe losses, but this was avoided as conscripted labour was supplied for short periods. The use of machinery is extending for all operations, and three of the largest growers have cleaning and sorting plant which has led to a considerable saving in labour. Semi-skilled labour is still required for the more intricate processing and harvesting. Field inspection

must also be carried out at frequent intervals and requires skilled attention. The industry is making steady progress and is considering the appointment of an inspector both to work in the field and to inspect the beans before export. Shortage of fumigants has made insect control difficult."

Exports totalled 490 tons.

Beans.—Good crops were harvested in most areas and, although there is a heavy local consumption, a considerable surplus was available for export and the black-market.

Cotton.—Purchases of native grown seed-cotton by Districts and the cash payments to growers during the season were as undernoted.

Purchases in kilogrammes.

District	"A" Quality	"C" Quality	Total	Cash payments Shs. Cts.
Moshi ...	90,772 ...	15,874 ...	106,646 ...	29,780 67
Arusha ...	12,517 ...	964 ...	13,481 ...	4,015 14
Mbulu ...	25,464 ...	6,701 ...	32,165 ...	7,713 56
	128,753 ...	23,539 ...	152,292 ...	41,509 37

The following table shows the figures of native seed-cotton production for the past five seasons :

Total Cotton Purchases in tons

District	1941/42	1942/43	1943/44	1944/45	1945/46
Moshi	361 ...	662 ...	110 ...	95 ...	107
Arusha	93 ...	28 ...	43 ...	33 ...	13
Mbulu	71 ...	60 ...	35 ...	— ...	32
	530 ...	750 ...	188 ...	128 ...	152

Weather conditions did not favour the crop and yields were poor; besides being a very dry year, cotton has lost place as a cash crop in the lowlands of Moshi and Arusha to maize, which ripens more quickly, is less trouble to prepare and gives a higher return per acre.

Planting was not encouraged in the Mbulu area in 1944 owing to the demand for labour in connection with anti-tsetse measures, but this year planting was resumed and a crop of 32 tons seed cotton was secured.

Onions.—Exports from the Province came to some 2,200 tons, to which total Moshi District contributed 875 tons, Arusha 673 and Mbulu 650 tons. Prices ranged from Shs. 4/- to Shs. 9/- a frasila during the season, the average being round about Shs. 5/-; at this figure the value of the crop represents a return to the growers of some £35,200.

Although the Moshi crop was below average due to very dry conditions at the time of transplanting, the Arusha and Mbulu crops were fair and of good quality and their export tonnage was a record.

Onion Seed Production.—The total production of onion seed in the Mbulu District amounted to 1,510 lb. only from 13·64 acres. The failure was mainly due to a severe infestation of onion thrips.

Irish Potatoes.—The Agricultural Officer, Arusha, reports that the production of potatoes by natives and at the Forest Station was continued with good results.

Of the Moshi crop, the Agricultural Officer writes: "The Rongai forest settlement had a bumper potato crop from the 1944 short rains from which some 2,300 bags were sold for consumption, much going to Dar es Salaam and Tanga, and 200 bags being sold for seed, orders being received from Iringa, Morogoro and Kilosa. The crop was inspected by the Plant Pathologist who remarked on its singular freedom from disease. Potatoes in the other mountain areas were not a success owing to the dry weather following the rains."

Root crops.—The cultivation of the sweet potato has been encouraged particularly in the Mbulu and Arusha Districts where the quick maturing varieties are becoming more popular. Cassava cultivation is not extensive, being practically confined to the lowland areas where alien settlements are found.

Experimental Work

The following main conclusions were drawn by the Agricultural Officer, Moshi from three experiments on methods of cultivation, on spacing and on nitrogenous manuring of onions carried out by him during the year:—

(a) That the Chagga method of cultivation on flat beds gives higher yields than any other method tried, yielding 6·58 tons of onions per acre under the conditions of this experiment;

(b) That the Chagga custom of spacing their onions very close together gives the highest yields per acre but reduces the size of the onions from 9 to the lb. at wide spacings to 10·40 to the lb. at the closest spacing of 4½ inches, yields being 6·42 and 9·79 tons respectively under the conditions of this experiment; and

(c) The application of Shs. 37/- worth (2 cwt.) of Sulphate of Ammonia per acre raises the value of the crop by Shs. 302/50 at Shs. 3/- per frasila. Yields were:

Sulphate of Ammonia	:	10·11	tons	per acre
Nil	:	5·27	,,	,, ,,
Increase	:	4·84	,,	,, ,,

Demonstration Plots

The Agricultural Officer, Mbulu, reports as follows: "A twenty acre plot has been commenced at Bashay in an irrigable area comprising ten two-acre plots. Four plots are arable for rotation and six grazing paddocks. The intention is to record production from the food plots and maintain a herd of from 6-8 head of cattle in the paddocks, supplemented by stall feeding from the rotation plots."

Native Settlement

The Agricultural Officer, Mbulu, reports as follows on the Native Settlement Scheme at Mbulumbulu: "Settlement, in the real sense of the word, has not yet been established. It is dependent upon the introduction of cattle, without which few settlers will bring their wives and children. Grazing is insufficient until tsetse clearings are extended, and settlers were not desirous of bringing in the few head per family which were justified by the available grazing and having to leave others behind."

Soil Conservation

District reports provide the following information :—

Moshi.—"Twenty Agricultural Instructors have concentrated on laying out contours for the Chagga and all old works have been maintained and, in Rombo, improved. They have also demarcated contours on nearly 3,000 acres of farms belonging to the Custodian of Enemy Property. Water supplies in Rombo remain in urgent need of improvement."

Arusha.—"A certain amount of progress was made on plantations in the pyrethrum-growing areas and at Monduli. Elsewhere, the arrival of suitable machinery and the opportunity to use it are awaited.

In native areas propaganda has been continued but lack of constant European supervision and drive has held up progress. During dry periods as well as during heavy rain much damage is done to the temporary measures already in force."

Mbulu.—"This work makes slow progress—contour trenches are visible in most areas but are usually unsatisfactory both in quality and quantity. A surveying gang is permanently employed in marking out contour lines, but the work is slow, and it is hoped to increase the number employed on this work next year. All Instructors have been ordered to devote particular attention to the maintenance and improvement of trenches."

Northern Province Wheat Scheme.—Five hundred acres of the Northern Province Wheat Scheme area at Ngare Nairobi were terraced during the year: the work was carried out by machinery and results have been satisfactory.

Post-War Development

The Agricultural Officer, Moshi, writes: "While the stage has been laid by the Moshi Native Coffee Board for an ambitious programme of development in coffee matters, the equally urgent developments required for Chagga expansion, for improving crops and their yields and for the provision of water supplies are held in abeyance from lack of staff and the failure to introduce the Chagga development tax, unfortunate in view of the fact that both the tribesmen and the returning soldiers are at the peak of their prosperity and all the pointers for the future are to financial austerity.

In order to pave the way for post-war development of which they have heard so much and to give them a balanced outlook on schemes which it was hoped would be placed before them in the course of time, parties of Chiefs and Instructors were taken on three excursions to the Taveta Irrigation Scheme, the Arusha Masai dams and to the Oldeani farms and soil conservation works of the Custodian of Enemy Property. They were able to see modern machinery which might be employed in a collective cultivation scheme. Two visits were paid to the Coffee Research Station by Chiefs, members of the Kilimanjaro Native Co-operative Union and Instructors to see the progress of experimental work."

Vermin Destruction

The following extracts from district reports indicate the position during the year :—

Moshi.—"Six Instructors employed by the Native Treasury have done good work destroying pig and baboon, mainly in the lowland areas and most

calls on their services have been met. Elephant and game have caused considerable damage to crops in Rombo and the lowlands and increased crop protection is an urgent necessity."

Arusha.—"Game, rats, baboons and other vermin have done considerable damage to crops, particularly maize, wheat and beans, planted in the more remote areas, or under irrigation. A number of Italian rifles were lent by the Game Preservation Department and were issued to planters to protect their crops."

Mbulu.—No serious damage by vermin is reported from this area.

Pests and Diseases

Coffee Pests.—Antestia, thrips and coffee stemborer were again active and there is little doubt that these pests have tended to increase during recent years owing to the shortage of insecticides and labour.

Maize Pests.—Stalk-borer and cut-worms were the main pests recorded during the year.

Wheat Pests and Diseases.—Little mention is made in District reports, regarding wheat pests and diseases although aphis and both stem and leaf rusts caused severe damage in certain areas operated by the Northern Province Wheat Scheme.

Pyrethrum Pests.—Some damage was caused by thrips during the warm months.

Onion Pests and Diseases.—Damage by thrips and Downy mildew was reported at Mbulu.

Desert Locusts.—Swarms were present in the Province in March and again towards the end of the year but did little damage. Egg-laying took place in the Moshi District in December and both eggs and hoppers were satisfactorily dealt with.

Miscellaneous

Production Committees.—Both Committees functioned throughout the year—the fourth since their formation. The Arusha Committee met on nineteen occasions; twelve meetings were held by the Moshi Committee.

Shows.—A small agricultural show, mainly supported by the Chagga and planters outside the district, was staged at Moshi in aid of the Red Cross and raised the sum of £118.

J. V. R. Brown,
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ANNUAL REVIEW OF THE SOUTHERN PROVINCE FOR 1945

Administration

The Senior Agricultural Officer is stationed at Lindi, with an Agricultural Officer to look after Lindi District, an Agricultural Assistant at Kilwa, another at Masasi and a Crop Supervisor in Tunduru and Mikindani. Liwale and Newala districts are without Agricultural staff except for Instructors working under the District Commissioners, and directly under the Senior Agricultural Officer.

Songea was not under the Senior Agricultural Officer, Lindi, during the year.

Staff

Mr. C. J. McGregor was Senior Agricultural Officer, Lindi until 20th October 1945, but was on sick leave for four months, Mr. A. S. Stenhouse was Senior Agricultural Officer, Lindi, from October until the end of the year: Mr. F. E. Luscombe was Agricultural Officer, Lindi, from July till the end of the year; Mr. L. Leslie-Moore, Senior Agricultural Assistant, was stationed in the Kilwa District until 15th September, when he proceeded on leave: Mr. K. Johansen, Agricultural Assistant, was stationed at Masasi until 10th December, when he proceeded on leave: Mr. John Deacon, Crop Supervisor, was stationed in Tunduru throughout the year. Mr. D. Madeleine, Crop Supervisor, was stationed at Lindi until 14th December, when he was transferred to Mikindani; Mr. T. W. H. Dore, Agricultural Assistant arrived on first appointment and was stationed at Lindi from 2nd November till 3rd December when he was transferred to Kilwa.

Touring by the staff during the year was as follows:—

	Nights away	Single days away	Period
C. J. McGregor	47	11	5½ months
A. S. Stenhouse	3	6	2 ,,
F. E. Luscombe	107	2	6 ,,
L. Leslie-Moore	257	—	9½ ,,
K. Johansen	151	87	11 ,,
T. W. H. Dore	17	—	2 ,,
J. Deacon	167	102	12 ,,
D. Madeleine	180	12	12 ,,

African Instructors were posted as follows during the year:—

	Local Civil Service	War Production Staff	Messengers
Lindi	11	5	1
Mikindani	3	6	—
Masasi	5	5	—
Newala	4	4	—
Tunduru	3	7	—
Kilwa	6	5	1
Liwale	2	3	—

Weather

The main feature of the weather was the unusually early onset of the rains and a general over-abundance of rain throughout the season. Destruction of native plantings by flooding and washaway was considerable, and generally, the conditions were not conducive to early ripening or heavy crops. Generally a poor season.

Food Supplies

There were no food shortages in native producing areas during the year, and this must be attributed to the increased areas under cultivation. Generally, supplies in the hands of native producers were adequate to plentiful. Surpluses for sale, on the other hand, were conspicuously small, so that consuming centres like Lindi township and the sisal estates were very short of grain supplies during most of the year. In contrast to the meagre supplies of grain, cassava and cassava flour has been plentiful.

Crop Production

The area under cultivation is stated to have been well above average. This is born out by the fact that there were no food shortages, despite a very indifferent producing season. Export tonnage was very low compared to average as might have been expected.

In the Lindi District there was a good response to the call for increased areas under crops, but all efforts were nullified by the weather. Lindi township and the sisal estates have been short of grains, but the producers have all had sufficient.

The Newala District produced surpluses of all crops, including large quantities of cassava, some of which was exported. The rainfall during the growing season (not the calendar year) was 52·66 inches against an average of 39·03 inches.

The Mikindani District also had exceptional rainfall, with 23·18 inches in January against an average of 7·16 inches, and a seasonal total of 57·01 against an average of 34·03 inches. Crop production suffered accordingly, and dangerous floods in the Rovuma valley destroyed all crops including rice. In spite of this disaster the District was self supporting and exported considerable quantities of produce.

The Masasi District is one which always suffers from a shortage of rain, and drought-stricken crops. In the past season the District enjoyed 48·19 inches of rain during the cropping season against an average of 36·07 inches. Crops in general were better than usual and there were no food shortages in the District although there was little surplus for sale.

The Tunduru District, like the Masasi District, often suffers shortages due to poor distribution of the rains, but in the past season heavy, well established rainfall generally resulted in good crops with fair sales of cash crops such as sesame and groundnuts. There were no food shortages. Rainfall during the cropping season amounted to 59·06 inches against an average of 40·03 inches.

Sisal.—This is the most valuable export product of the Province. There have been labour difficulties, largely due to the inadequate supplies available for feeding the labour. Exports amounted to 11,285 tons valued at Shs. 6,442,220/-.

Sesame.—Exports of this crop advanced from 2,654 tons in 1944 to 3,224 tons in 1945. Since this crop does badly in seasons of excessive rainfall, it will be realized that this satisfactory figure was achieved by more extensive plantings than are usual.

Grain (other than Rice.)—All grain crops had a poor season and only light and patchy yields were secured. One thousand tons of mtama was exported, mostly from Mikindani. The rest of the Province produced little for sale. Fortunately the increased plantings produced sufficient for local needs apart from shortages in Lindi township, and on sisal estates.

Groundnuts.—There was a good crop, especially in the more remote areas and exports amounted to 1,756 tons, mostly from the port of Lindi. Rosette disease was present but was not apparently serious.

Rice.—Production was not up to usual. It is difficult to understand this, for the heavy rains should have favoured this crop except where excessive floods occurred. Little was sold and there were no exports. Methods of production are very primitive and there is scope for extension and improvement of this crop but one would have expected a season of heavy rains to produce considerable quantities of rice for sale.

Copra.—An average good season gave an average crop. The count of nuts from individual trees for seed selection purposes went on with the following results :—

Number of trees bearing	...	nil nuts	...	6 trees	
,, ,,	...	25—50 ,,	...	25	,,
,, ,,	...	50—75 ,,	...	64	,,
,, ,,	...	75—100 ,,	...	82	,,
,, ,,	...	100—125 ,,	...	70	,,
,, ,,	...	125—150 ,,	...	35	,,
,, ,,	...	150—175 ,,	...	22	,,
,, ,,	...	175—200 ,,	...	10	,,
,, ,,	...	200—250 ,,	...	8	,,

The applications of the Coconut Ordinance were more strictly applied, particularly in the Kilwa District, with great benefit to the coconut growers. Most of the exports of this produce are from Kilwa. The Lindi and Mikindani production is utilized locally.

Pulses.—Exports increased. This was because the failure of much of the crops due to flooding made available extensive areas for dry season plantings at an early date. These bottom lands were planted up as the floods receded and good crops were secured. Pigeon peas in particular yielded well.

Beeswax.—Forty-five tons of beeswax were exported. This was a very big drop in production of this important commodity. Traders state that much of it is passing over the border to Portuguese Territory owing to higher prices there.

Cashew nuts.—A lively demand has led to the unloading of old stocks on to the market. This, together with this year's crop has brought cashew nuts up to second place in value of the export products of the Province. Nearly 4,000 tons were exported but this figure must not be taken as a measure of present production. The season suited the crop.

Cassava.—This crop is extensively planted, especially in the Newala and Mikindani areas. There was little call for export of this product, so that reserves have again been built up after the heavy sales of 1943/44. The Masasi, Tunduru, Liwale, Kilwa and Lindi Districts require to increase their reserves of this product.

Colombo Root.—There was again an increase in the exports of this product. The shortage of grains for sale possibly accounts for part of this increase.

Starch.—Exports dropped to 108 tons.

Roll Tobacco.—Exports dropped to 129 tons. In part this is accounted for by the planting up of flood lands with food products when it became apparent that the flooding had reduced food reserves to dangerously low levels. Normally such flood lands would have carried crops of tobacco.

Wild Rubber.—One hundred and eighteen tons were exported. This increase is partly accounted for by carry over from the previous year and in part due to the scarcity of the usual grain crops for sale.

Gum Copal.—One hundred and thirteen tons were exported. The quality was good. There is a considerable carry over.

Mangrove Bark.—Exports rose to 3,455 tons against 1,575 tons.

Cotton.—Excessive rain and late planting resulted in poor crops. Indifferent marketing arrangements caused discontent amongst producers and much of the cotton remained unpicked until very late in the season. Damage by rats was excessive and widespread. Except in the Kilwa District, seed distribution for the coming season has been completed. Figures of seed cotton purchases are given as an annexure.

General

The Province lives by its exports and the economic history of the season can be read in the figures for exports and their value. Sisal and mangrove bark are the only products which natives do not sell, although they are the fruits of their labour. All other exports from the Province are the products of native producers working independently, but such activities are confined to the economic transport zone. For grains, this zone is little more than eight miles from any port. For sesame and groundnuts, it extends to about 150 miles, in present circumstances. An increase in the amount of incoming trade goods would increase this economic zone. Improved roads and transport would have the same effect.

In 1912 the following was written about the Lindi District: "The two drawbacks to the further development of the cotton growing industry in this District are lack of transport facilities and lack of work people and, until some solution of these difficulties presents itself, there is little prospect of the cotton plantations of the Lukuledi valley being a commercial success."

What was true then is true now, thirty-three years later, except that we do not visualize plantation production of cotton, but rather peasant production, which is usually much sounder; but lack of good and cheap communications is still a serious limiting factor.

Marketing of Crops

Native Authority Markets have been established throughout the Province except in Tunduru and have been very successful, particularly in the greater producing areas. Generally the native producers have welcomed the setting up of these markets and there is a great demand for more of them. This in turn depends upon better communications, but even so it can be said that the marketing scheme is off to a good start.

Transport

There have been no serious transport difficulties during the year, except those arising from the indifferent road system and the somewhat sketchy shipping service.

Instructors Training

The Mahiwa course for training instructors has proved its value. The low standard of most of our old instructors became very apparent, and it was necessary to replace those whose personality and experience did not off-set their lack of educational achievement.

Mahiwa Rice Station

This station was opened to investigate problems of production generally in this area, and particularly to study problems of rice production. It is intended to carry out trials of local and introduced rice, and to multiply for seed one or more varieties which may prove suitable for local conditions. It is also intended to investigate, and where necessary to modify methods of production with a view to their adoption throughout the rice producing areas of the coastal belt.

To this end some twenty-eight bunded dams under controlled irrigation have been prepared and are being levelled. The process of levelling has disturbed the soil so that exact experimentation is not possible until some uniformity of fertility is again reached, but the dams can be used for multiplication of desirable varieties, and also as demonstration plots.

There seems little immediate prospect of persuading our lethargic cultivators to undertake the arduous work of bunding and levelling dams, so, as a modification, a demonstration has been prepared with a simple contour bank designed to impound rain water. By planting at right angles to the contour it should be possible to have all gradations of conditions from plentiful water near the contour bank down to comparatively dry conditions such as natives use. This trial should demonstrate quickly whether simple contour banks would be an advantage or not and there will be some prospect of inducing natives to make such contour banks if we mark them, should the demonstration prove that they are desirable. The later work of straightening the banks and adding "wings" to retain more water, and at the same time allowing the water to do the levelling, should appeal to the natives more than the arduous dam making.

During the year simple trials at different spacings were carried out with some fourteen named rices. The results were not very significant, but demonstrated that under dam conditions a spacing of about 10½ inches between plants gave the best results with most varieties. Actually the results were so variable, as between undisturbed soil and transported soil used in levelling that the findings should not be stressed without confirmation.

Pests, Diseases and Vermin

Game and vermin took their usual toll of native agricultural produce. The producers themselves are more likely to devise effective measures against these pests than anyone else. Many of them choose to live in remote and isolated areas where they must suffer losses. In the days of trible wars, when mutual protection required concentration, joint action against raiding game and vermin was possible. Now these scattered communities look to Government for

protection. The concentration of population now being implemented by the Administration will make joint native action against raiders more easily organized.

Elephant, pig, baboon, warthog, monkeys and rats were mainly responsible for crop destruction.

There were no reported outbreaks of serious insect pests or diseases during the year and the Province remained free of locusts.

Resettlement

The Njinjo area of Kilwa District set aside for resettlement of the bulk of the Liwale population is still in process of being surveyed. Some 1,200 families have been settled in this area and preparations for more intensive resettlement of a yet larger number of people are in train for completion during 1946, and by 1947 the Liwale District should be cleared of all human inhabitants except employees of the Game Department. There have been numerous set-backs to this resettlement scheme but real progress is to be recorded.

Acknowledgments

The close and readily given cooperation of all Administrative Officers is gratefully acknowledged. In these days of shortage of staff, a great deal of our work could not go on in the absence of close team work, and it is largely to such team work that our measures of success in an indifferent agricultural season must be attributed.

Annexures:

1. Rainfall Records.
2. Export figures.
3. Cotton purchases.
4. Return of Produce passed through the Native Authorities Markets, Lindi.

A. S. Stenhouse,
Senior Agricultural Officer,
Southern Province

Annexure I

RAINFALL IN INCHES—SOUTHERN PROVINCE

Season 1944/45

	1944										1945															
	August Rain-Days		September Rain-Days		October Rain-Days		November Rain-Days		December Rain-Days		January Rain-Days		February Rain-Days		March Rain-Days		April Rain-Days		May Rain-Days		June Rain-Days		July Rain-Days		Total Rain-Days	
Lindi	0·55	2	0·66	2	0·28	2	3·70	15	8·25	17	7·25	20	7·19	14	7·67	17	6·19	15	3·17	7	0·01	1	–	–	44·92	112
Average	0·23	–	0·48	–	0·63	–	1·63	–	5·42	–	5·71	–	5·24	–	7·37	–	5·91	–	1·57	–	0·46	–	0·26	–	34·52	–
Masasi	–	–	0·13	1	0·15	2	8·15	16	13·00	3	10·67	16	6·13	13	5·84	13	4·12	8	–	–	–	–	–	–	48·29	72
Average	0·07	–	0·74	–	0·41	–	1·50	–	4·51	–	7·03	–	8·67	–	8·25	–	4·36	–	0·81	–	0·01	–	0·01	–	36·07	–
Newala	0·05	1	–	–	–	–	5·40	9	12·46	10	13·16	13	5·16	11	10·19	14	3·78	4	2·51	6	–	–	–	–	52·71	68
Average	0·04	–	0·10	–	0·20	–	0·99	–	7·69	–	10·16	–	7·95	–	7·20	–	3·06	–	1·29	–	0·20	–	0·06	–	39·03	–
Mikindani	0·16	2	2·26	3	1·42	2	4·99	10	4·13	8	23·18	18	7·40	9	7·89	14	2·57	6	3·01	7	–	–	–	–	57·01	79
Average	0·25	–	0·50	–	0·44	–	1·46	–	5·79	–	7·16	–	4·78	–	5·75	–	6·06	–	1·79	–	0·52	–	–	–	34·50	–
Kilwa	0·76	2	0·08	1	0·69	2	8·54	7	7·20	6	6·10	7	1·85	4	9·52	12	7·83	7	8·46	8	0·39	1	–	–	51·42	57
Average	0·45	–	0·76	–	0·78	–	1·86	–	4·41	–	5·21	–	4·26	–	7·05	–	8·42	–	2·67	–	0·53	–	0·32	–	37·04	–
Liwale	–	–	0·07	1	0·50	1	5·90	7	4·06	9	12·56	16	8·66	9	11·05	15	5·61	6	4·91	6	–	–	–	–	53·32	70
Average	0·15	–	0·12	–	0·40	–	1·51	–	5·46	–	7·44	–	5·79	–	7·96	–	4·37	–	1·05	–	0·20	–	0·04	–	34·54	–
Tunduru	–	–	0·40	1	0·84	2	4·29	13	8·13	19	18·20	22	12·75	16	6·92	15	6·49	11	1·04	5	–	–	–	–	59·06	104
Average	0·06	–	0·12	–	0·18	–	1·11	–	7·16	–	11·21	–	10·09	–	6·31	–	3·40	–	0·51	–	0·14	–	0·04	–	40·33	–

Annexure I

Principal Agricultural Exports from the ports of Kilwa, Mikindani and Lindi, in the Southern Province:

	1942	1943	1944	1945	Value	
	Tons	Tons	Tons	Tons	Shs.	Cts
Sisal	14,505	13,359	13,163	11,139	6,442,220	00
Cashew Nuts	175	269	355	3,971	1,158,259	55
Sesame	4,100	5,162	2,654	3,223	891,952	20
Groundnuts	1,744	1,402	954	1,756	504,940	70
Mangrove bark ...	—	1,620	1,575	3,455	450,450	00
Pulses	295	521	339	858	177,203	88
Wild Rubber	29	121	64	118	173,371	71
Copra	544	684	809	699	174,545	77
Beeswax	149	151	113	45	142,618	62
Colombo root ...	—	67	192	346	137,501	00
Mtama	4,713	4,265	2,003	1,029	136,992	20
Tobacco	320	170	178	130	111,708	01
Gum Copal	—	79	163	113	91,537	40
Other grains	909	90	84	370	77,793	00
Native Starch ...	—	257	253	108	34,883	40
Cassava	—	4,144	7,957	261	29,565	75
Maize	20	1,759	1,505	48	8,728	00
					Shs. 10,744,451	19

Annexure III

SEED COTTON PURCHASES DURING 1945/46 SEASON

District	Quantity "A" Kilos	Quantity "C" Kilos	Value Shs.
Lindi	108,845	31,558	32,207·03
Masasi	31,354	2,626	8,829·82
Tunduru	69,453	2,745	16,748·98
Kilwa	43,836	17,365½	13,156·05
Mikindani	98,407	21,560	43,048·20
Total purchases...	351,895	75,854½	113,990·08

FOOD CROPS AND OTHER PRODUCE PASSED THROUGH THE NATIVE AUTHORITY MARKETS, LINDI

	Simsim	Ground-nuts	Sorghum	Maize	Rice, Bungala & Sifara	Rice, Ngwin-dimba	Kunde	Mbaazi	Choroko	Njugu-mawe	Cassava	Cashew Nuts
	Kilos	Kilos	Kilos	Kilos	Kilos	Kilos	Kilos	Kilos	Kilos	Kilos	Kilos	Kilos
Sudi	5,520	—	14,701½	—	—	—	770½	740	437	—	2,610	170,341½
Madangwa	4,795½	—	36,652	28	—	—	211	1,488	5	—	9,712	17,492½
Kitunda	290	280	820	440	310	—	330	110	260	40	310	2,840
Mingoyo	36,926½	25½	4,370	280½	2,214½	224½	679½	592	1,620½	49	—	286,729½
Ruo	44,121	43	244,492	1,600	21,189	—	866	—	106	—	—	—
Wangawanga	3,720	451	29,127	850	1,047	—	—	1,522	—	476	—	—
Mtama	45,630	5,091	32,130	5,138	—	—	24,680	—	—	—	—	—
Nyangao	22,766	30,273	43,704	7,247	—	—	59,446	93,932	36,817	30,368	9,287	—
Muacho	37,334	1,111½	31	—	—	—	981	36,265½	4,042	—	881	—
Nghimba	64,584	19,919	8,403	—	—	—	5,968	27,869	8,191	—	5,061	—
Ruwangwa	239,635½	1,434½	5,778½	—	—	—	8,060	30,234	1,013½	76	—	—
Namichiga	135,838	—	34	—	—	—	1,174	2,086	26	—	406	319
Mnero	16,110½	13,163	7,707½	—	—	—	2,637½	11,724½	3,177	—	4,972	—
Lionja (Nghunichile) ...	12,380½	3,063	7,645	—	705	—	537	2,226	1,554	34	—	—
Marambo	5,526½	—	2,252	—	296	—	959	-	396	99	—	118
Kitomanga	31,786	—	52,287	3,863	—	—	34,758	1,363	433	-	1,183	—
Nangaru	18,233	—	73,440	—	—	—	17,082	33,297	—	—	—	—
Mchinga	11,837	—	7,309	—	—	—	—	161	—	129	—	269
Mitwero	3,954½	—	1,341½	—	—	—	—	1,744	162	195	838½	15,378
Namchinama	1,904	—	8,692	—	—	-	1,319	-	20	—	—	2,266
Jangwani	2,889	—	5,632	—	—	—	1,390	4,225	49	—	5,585	39,485
Moka	71,912	—	37,810	34	60	—	14,660	8,003	520	—	9,432	16,450
Milola	299,751	—	23,205	—	1,277	—	50,854	131,325	—	79,712	—	—
Rutamba	64,026	—	6,995	—	—	—	13,438	94,215	—	27,868	—	—
Ngapa	63,934	—	19,706	166	—	—	6,890½	15,725	288	801½	1,597½	50,737½
	1,154,405½	74,854½	474,268	19,646½	27,098½	224½	197,391	578,845	65,010	139,847½	51,875	602,405½

ANNUAL REVIEW OF THE SOUTHERN HIGHLANDS PROVINCE, 1945

Staff

European: Mbeya.—Mr. A. S. Stenhouse, Senior Agricultural Officer, 1.1.45-18.4.45. *Iringa.*—Mr. J. G. M. King, Acting Senior Agricultural Officer, 18.4.45-31.12.45; Mr. D. Thornton, Agricultural Officer, 1.1.45-4.5.45; Mr. J. H. MacGregor, Tobacco Officer, 1.1.45-31.12.45; Mr. A. H. B. Childs, Agricultural Assistant, 17.11.45-31.12.45; Mr. F. F. G. Jocks, Crop Supervisor, Pawaga Irrigation Scheme; 1.1.45-3.11.45 (Decd. 3.11.45); Mr. F. J. Pieterse, Pig Stockman, Iheme, 1.1.45-13.8.45 (termination of appointment); Mr. K. B. Louwrens, Agricultural Assistant (Assistant Tobacco Officer) 24.12.45-31.12.45. *Songea.*—T. H. Marshall, Agricultural Officer, 1.1.45-18.10.45 (afterwards transferred to Mbeya); Mr. R. W. Collett, Agricultural Officer, 22.10.45-31.12.45. *Tukuyu.*—Mr. D. H. Thwaites, Agricultural Assistant, 1.1.45-14.4.45 (afterwards transferred to Mbeya); Mr. B. R. D. Eccles, Agricultural Assistant, 23.6.45-31.12.45. *Mbeya.*—Mr. D. H. Thwaites, Agricultural Assistant, 14.4.45-21.10.45 (afterwards transferred to Iringa, 29.10.45-31.12.45); Mr. T. H. Marshall, Agricultural Officer, 19.10.45-31.12.45; Brigadier W. E. H. Scupham, C.M.G., M.C., M.L.C., Chairman and Executive Officer, Iringa Production Committee (1.1.45-31.12.45); Mrs. P. Camurri, Secretary, Iringa Production Committee, 1.1.45-31.10.45; Mr. W. Sibley-Warne, Senior Agricultural Assistant, was seconded throughout the year to the Ngoni-Matengo Co-operative Union, Songea.

African: (i) Two Grade III, L.C.S. Clerks, three Grade III, L.C.S. Instructors, four Ungraded L.C.S. Clerks, fifty Ungraded L.C.S. Instructors, two Ungraded L.C.S. Recorders, three Ungraded L.C.S. Overseers, forty War Production Staff—Instructors, four Messengers.

(ii) Seven Native Authority Instructors.

Weather

The 1944/45 rains broke unusually early throughout the Province and were exceptionally heavy at the beginning. In most districts they broke in mid-October and continued unabated for the first three months. Extensive damage to crops is reported from Songea and Tukuyu where floods washed away many of the rice fields and maize lands in the lower areas. Further damage is reported again from Tukuyu in March and April, when considerable areas of rice land were completely destroyed by floods. In the northern part of the Province the rains ended unduly early, with the result that the late planted maize crops did not mature, nor did the wheat which is customarily planted in March and early April.

Available records from stations in the Circle are given in Annexure I.

Maize.—With the exception of Iringa District, which produced a large and excellent crop, the maize crop throughout the Province was small, due to the unfavourable weather conditions. In the early part of the season considerable damage was caused by excessive rain, while later in the year the crop did not get the late rains necessary to bring it to maturity. A shortfall occurred in the Mbeya and Chunya districts due to stalk borer, army worm and the depredations of rats.

Rice.—The very heavy rains from January to April caused serious flooding, which completely destroyed much of the rice in the Ikola area of Rungwe District. Other areas suffered very extensive damage, with the result that the paddy crop amounted to only 1,104 tons as compared with 3,000 tons in the previous year.

A small crop of 50 tons was also produced by the Pagawa Irrigation Scheme in Iringa.

Wheat.—Conditions varied very considerably throughout the Province. An excellent wheat crop was produced in Umatengo in the Songea District, totalling 577 tons. It is of interest to note that this Songean native wheat is reported to be of very high quality. The Manager of Messrs. Unga Limited reported that it is the best sample of native grown wheat that he has yet seen, and that it compares very favourably with any wheat he has seen grown in Kenya or in the Northern Province of the Territory. It has a high bushel weight, in spite of being threshed by hand. A mechanical threshing unit is clearly wanted for this excellent crop.

In the Njombe District conditions were not so favourable. In parts of Ukinga, due to stem rust, the crop was a virtual failure; while in other areas the crop, though satisfactory, was all required locally for food.

In Mbeya a comparatively good wheat crop was harvested, but none came on to the market. This may be attributed to the failure of the European potato crop, the wheat being eaten by the natives in the absence of potatoes.

Beans.—Beans have been short throughout the Province this season. The first plantings were ruined by the heavy rains, and the second plantings were patchy due to the early cessation of the rains. The second crop was good, however, in the Mbeya District.

Peas.—Owing to the early termination of the rains in the Mufindi area, the crop was a virtual failure.

Eleusine.—In Rungwe the crop was small compared to previous years—14 tons as against 37 tons in 1944. In Iringa and Mbeya a good crop was harvested. During the latter part of the year there was a very considerable increase in acreage being prepared for planting. As eleusine is generally planted on steep hillsides, where the trees are felled and burnt with the bush and grass, erosion is accelerated and the cultivation of this crop is now becoming a major problem.

European potatoes.—With the exception of Umatengo in Songea, the early plantings of potatoes throughout the Province were practically wiped out by late blight. The Mbeya and Njombe districts were particularly badly hit by this outbreak of disease, as the natives have grown accustomed to relying on potatoes as part of their diet. In Mbeya District 291 tons were sold as compared to over 1,000 tons in 1944.

The Agricultural Officer, Mbeya, reports: "It should be noted that the white variety of potato (Aran Chief), grown in the Mporotos mountains, appears more susceptible to blight than does the red variety, the white being attacked earlier than the red. The large majority of potatoes are grown as "volunteers" and it is difficult to foresee an improvement in the disease situation until the native growers change to better methods of cultivation."

In an effort to save some seed for the Mporotos, five small plots were planted up and sprayed regularly at fortnightly intervals with a one per cent Bordeaux Mixture, and these plots are free from blight. These tubers will be used for planting purposes, and assistance will be given by the loan of sprays and spraying materials to those natives who will plant pure stands of this crop.

Coffee.—Record crops of native coffee were harvested in the Rungwe and Mbeya districts. The figures of parchment coffee are:—

	1941	1942	1943	1944	1945
Mbosi (tons) ...	37	36	18	31	54
Rungwe „ ...	54	63	108	183	194

Coffee statistics for both districts are given in Annexure III.

The Agricultural Assistant, Tukuyu, reports that most of the coffee in the District is now terraced, and, generally speaking very well tended. The multiple stem system has taken on and good yields are obtained. In other areas a considerable amount of the coffee is overshaded by bananas and little pruning is done. Yields in these areas are poor, but the cultivators are responsive to instruction. In the Bandali area there are many derelict coffee plots as the owners have left the area. These are to be uprooted and burnt.

The Agricultural Officer, Mbeya reports that "the coffee in all areas suffered from leaf disease and leaf fall, and die-back was heavy." It was a year of over-bearing.

Songea.—A small crop amounting to 15 tons was purchased by the Ngoni-Matengo Co-operative Society.

Tobacco.—The native producers of fire-cured tobacco leaf in Songea had one of the worst seasons on record and production fell again to 160 tons. Figures for the Songea native grown fire-cured crop were:—

Purchases (in kilograms).

	1941	1942	1943	1944	1945
I ...	73,038	104,214	225,519	46,781	38,175
II ...	124,414	89,396	160,701	50,636	48,176
III ...	159,411	89,652	129,227	65,140	61,129
IV ...	—	43,367	196	—	12,947
	356,863	326,629	515,643	162,557	160,427

Tobacco available for Sale (in kilograms).

	1941	1942	1943	1944	1945
I ...	72,857	72,525	191,643	49,909	49,922
II ...	138,108	100,831	146,361	61,459	57,046
III ...	141,582	85,738	99,124	53,678	33,239
IV ...	—	51,035	30,225	6,596	16,316
	352,547	310,129	467,353	171,642	156,523

A comparatively good crop was obtained from the eastern part of the District while in practically all other areas the crop was relatively poor and considerably reduced owing to too heavy rainfall and red rust disease.

Food Supplies.—By and large, food supplies have been adequate throughout the Province during the year, in spite of somewhat unfavourable weather conditions. The production of foodstuffs was upset by the advent of unusually early and heavy rains, and by the fact that they ended unusually early in some parts of the Province. As a natural corollary to adverse weather conditions pests and diseases took a high toll of some crops. Late blight practically wiped out the potato crop, while stem rust caused severe damage to the native wheat in the Ukinga area of the Njombe District. The failure of the late rains in the Usangu area, and the depredations of rats in Chunya and Mbeya Districts, caused an unexpected and severe shortfall in the requirements of foodstuffs. Fortunately the non-native Iringa District production of maize of over 1,100 tons saved the Province from a serious position.

It is axiomatic that the experience of this season must be put to good use, and that more rational planning with regard to the Provincial food supplies must be adopted. In parts of the Province the food economy of the African is unsound, not to say dangerous, and further ameliorative measures must be taken to safeguard areas against famine. For example in Njombe District the cultivation of wheat and European potatoes plays a too important part in the food economy of the Wakinga. A total failure of either of these crops in any season, from disease, is quite possible. Steps have been taken this year to avoid such a disaster; the cultivation of rye has been introduced to replace wheat as a staple foodstuff, and sweet potatoes are being encouraged to replace the European variety. A greater variety of African food crops is desirable in the form of quick maturing legumes and cassava, and both have been advocated for all districts.

The marketing of Native Food Crops.—The produce markets, run under the aegis of the Produce Control, functioned satisfactorily throughout the Province. Undoubtedly, properly organized produce markets, under Government or Native Authority control, have proved popular, and are indicative of how markets should be organized in the post-war era.

The following native produce was sold through the controlled markets, including Songea. A comparative table of last year's purchases is included for interest :—

Commodity	1944 Tons	1945 Tons
Maize	7,157	4.268
Paddy	3,190	1,216
Coffee	234	270
Tobacco	176	160
Potatoes	1,488	56
Beans	501	242
Millets	384	335
Wheat	234	577
Cassava	102	165
Pulses	87	6
Banana Flour	—	10
Onions	—	10
Beeswax	—	34
Groundnuts	—	59
Sesame	14	121

A schedule showing the districts from which the above produce was obtained is given in Annexure II.

Maize and other general produce was purchased by nominated Government agents. Prices were fixed by Government depending on distance from the mill.

Paddy was purchased by the Rungwe Native Authority at 14 cents per kilo.

Coffee in Rungwe and Mbeya districts was purchased by the respective Native Administrations, with the help of this Department as to the grading. Prices paid to the grower for parchment coffee were: Grade A, 85 cents; Grade B, 45 cents; Grade C, 29 cents (per kilo).

The Songea crop was handled by the Ngoni-Matengo Co-operative Union. All the African crop is cured and despatched by the Utengule Estates, Limited, and all coffee was sold to the South African Committee of the Coffee Importers at £96 per ton f.o.r. the Union Border.

The Songea native tobacco crop was marketed by the Ngoni-Matengo Co-operative Marketing Union, and was disposed of to Messrs. Noakes of Liverpool; the East African Tobacco Company, Uganda; and the British American Tobacco Company. The inferior grades were sold locally.

The Songea native wheat crop was purchased by Perimiho Mission, who milled the requirements of the Southern Province and disposed of the balance to Nyasaland and to Messrs. Unga Limited of Iringa.

Non-Native Crops

Tea.—In the early part of the season the very wet conditions were favourable for tea, but later on the conditions became unfavourable owing to the long dry period, and the estimates had to be reduced. The reduced estimates were exceeded, however, by an exceptionally heavy flush of leaf in the latter part of the year. This autumn flush, just before the early rains, was particularly heavy in the Rungwe District. The total crop of made tea was :—

	Actual lb.		Estimate lb.
Rungwe District:			
Tanganyika Tea Company ...	269,677	...	200,000
Chivanjee Estates	50,794	...	80,000
Mufindi	559,243	...	547,000

The tea factories belonging to the Tanganyika Tea Company functioned satisfactorily throughout the season, and were adequate to cope with all tea produced not only on their own estates, but that from the Mufindi Tea Company.

The position of the Mufindi Tea Company appears somewhat uncertain, as Messrs. Jardine Matheson & Company, who were the Managing Agents, have withdrawn and are demanding the return of their money. This may have a crippling effect on the Company.

During 1945 a new allocation of 706 acres was made and 43 maunds of tea seed were imported from India to plant up the requisite nurseries, and also to obtain planting material for infilling the ravages of drought and unfavourable conditions of the 1944 and 1945 seasons. The germination of the seed has been excellent and the young seedlings in the nurseries look most promising. These goods results are undoubtedly due to the careful shipping and transport arrangements which were made in advance, and acknowledgment is hereby made to the Tanganyika Railways for their co-operation and efficient organization.

Apprehension is felt by all concerned as to the future of the tea industry in the Mufindi area owing to the changing climate. This is due to the declining rainfall and drop in relative humidity which is now occurring in the dry season and is caused by the deforestation of the area which has been going on in recent years. This deforestation has been done by Africans, who are increasing in numbers in the area, and also by the tea companies when planting up their

allocations. Undoubtedly mistakes have been made in the method of planting up these tea areas. Plans are, however, being prepared to arrest this deterioration in climatic conditions.

Pyrethrum.—Small plantings of pyrethrum were made this year to complete the "authorized" acreages. Deliveries to the Kenya Farmers' Association godown at Iringa were: 1942, 301,776 lb.; 1943, 333,907 lb.; 1944, 482,731 lb.; 1945, 988,494 lb.

Production by Areas

	1942 lb.	1943 lb.	1944 lb.	1945 lb.
Dabaga (Iringa)	60,995	59,506	85,928	151,293
Mufindi (Iringa)	112,798	55,258	92,351	139,901
Sao Hill (Iringa)	741	363	296	6,005
Uwemba (Njombe)	90,941	155,768	254,419	591,399
Lupemba (Njombe)	3,712	3,693	3,501	1,247
Mbeya	30,552	54,028	42,001	97,057
Rungwe	2,037	5,281	4,235	1,592

The 1945 production is very considerably greater than that in 1944, due to the young plantings coming into full bearing.

A revolutionary type of pyrethrum drier was designed and built by Mr. Otto Meith, Manager for Mr. H. J. Constantinides on the latter's estate in Dabaga. An extraordinarily low fuel to dry flower ratio is claimed and an official test is now being made by the pyrethrum expert of the Kenya Farmers' Association. 1·7 lb. of fuel to each pound of dry flowers produced is the figure given by the designer.

An interesting experiment with mulching pyrethrum in Upper Dabaga was laid down during the year. No results can yet be given, but indications clearly show that soil erosion and weeding are both reduced to a minimum.

Coffee.—Non-native coffee production in the Mbosi area of Mbeya District reached a record figure of 597·4 tons. 305·9 tons were produced by the estates managed by the Custodian of Enemy Property while 291·5 tons came from the other European estates.

A comparison of the production by the Custodian of Enemy Property estates is 1941, 311 tons; 1942, 205 tons; 1943, 185 tons; 1944, 115 tons; 1945, 305·9 tons.

The total non-native production for the Province for the year amounted to 609·4 tons.

Tobacco.—The producers of Iringa flue-cured tobacco experienced a bad year, both from the production standpoint and from that of the sales. The quality and quantity of the crop was lower than in 1944, and difficulty has been experienced in marketing a considerable portion of the crop. Many of the Greek producers have left the district as a result of the financial stringency consequent upon the failure to sell their crop. The Tobacco Growers' Association had a stormy meeting at the end of the year, when new members were elected to the Non-Native Tobacco Board. This Board is viewed with a certain amount of suspicion by some of the big producers as its members appear to be the Iringa Farmers' Association.

In May the Tobacco Board decided to erect a processing or conditioning plant, so as to condition the balance of the crop for export. Considerable difficulty was experienced in getting building materials and other equipment. After many delays and initial teething troubles the plant started operations on

16th November. Final figures for the crop are not yet available, but the following comparative table is given :—

Graded and baled in the Grading shed:	1943 lb.	1944 lb.	1945 lb.
Grades 1 to 6	383,748	576,751	506,130
Grades 7 to 11	143,274	227,226	135,106
Graded by Growers ...	328,822	713,692	328,403
Rejects	276,887	—	208,527
	1,132,731	1,523,669	1,178,166

(plus a further 300,000 lb. approx. Figures available at end of March).

In the latter part of the year the Board decided to put down some simple variety and manurial trials of tobacco, with the object of obtaining a better type of leaf. The Board anticipated the fact that with the cessation of hostilities and the cancellation of the Military contracts, the easy sales of poor quality tobacco would pass, and that only a high grade desirable type of leaf, free from the Iringa "tang" would be saleable in the future. The following varieties were planted at different planting times and with varying amounts of fertilizer: (1) White Stem Orinoco, (2) Gold Dollar, (3) Bonanza, (4) Cash, (5) Hickory Prior, (6) Local Iringa.

Maize.—The production of non-native maize in the Iringa District was very good. 1,100 tons of maize were marketed, in addition to a large quantity which was kept by the farmers for their own requirements. This production was undoubtedly due to the efforts of the Iringa Production Committee, who were instrumental in arranging orders to be issued for some 6,600 acres of maize. The outlook for the coming season is, however, poor, as many farmers have left the District, and those remaining have scaled down their programmes, due to the uncertainty of the tobacco market. Orders for only 3,800 acres of maize have been issued for the 1945/46 season.

Wheat.—The total non-native wheat crop sold in the Iringa District amounted to 110 tons. Considerable quantities of seed were kept back for planting purposes, and a large increased acreage has been prepared for the coming season. It is estimated that over 2,000 acres have been broken for the coming year.

It is interesting to note that at Rujewa, in the Usangu area north of Chimala a Baluchi farmer has been most successful with irrigated wheat. The land is manured and irrigated and two crops of wheat are taken per year. When Mr. Thornton, Agricultural Officer, Iringa, checked over his yields, they averaged over 10 sacks per acre per crop. The question of granting this excellent farmer an extension of a further hundred acres of land is awaiting Government's decision.

Pests and Diseases

By and large, pests and diseases were rife in the Province and considerable damage to crops was done. The following were the main pests and diseases :—

Locusts.—Red locusts bred again in the Lake Rukwa basin early in the year, and a hopper campaign was organized by the Locust Officer of the International Red Locust Control. There were many escapes, though little damage was reported to have been done in the surrounding country. Towards the end of the year egg laying took place again over a wide and scattered area in the Rukwa Valley. The Director of the International Red Locust Control,

Abercorn, took over charge of all operations in the Rukwa area in the latter part of the year. Assistance by this Department was given in the first hopper campaign and in the organization of the present full scale attack.

Coffee Pests: Coffee Borers.—The Supervisor of the Custodian of Enemy Properties, Mbosi, organized a borer campaign early in the year, and reports indicate that his efforts have been highly successful.

Antestia.—Considerable damage was done to the coffee in Mbosi in the early part of the season.

Hemelcia.—Was also severe in the coffee at Mbosi in the early part of the season.

Maize Pests: Maize Stem Borer.—This pest was again ubiquitous and did considerable damage in areas where the Vinlingo or swamp cultivaton is practised. Later in the season good results were reported from better plant sanitation methods, i.e. of uprooting and burning the maize roots.

Rats.—The maize crop in the Mbeya and Chunya districts was seriously damaged by rats.

Army Worm.—Early in the year damage to young maize in the Iringa. Mbeya and Tukuyu districts was reported.

Pyrethrum Pests.—Thrip damage was general in October and November in the pyrethrum fields at Uwemba.

Potato Diseases: Late Blight.—As reported above, Late Blight in potatoes virtually wiped out the potato crop in the Province, with the exception of the Songea District.

Wheat Diseases: Stem Rust in Wheat.—This was very severe in parts of Ukinga, Njombe District, where severe damage to the native wheat was done. Leaf rust was also present in the Njombe District and parts of Iringa.

Tobacco Diseases.—Considerable damage was done to the African tobacco crop by Leaf Rust early in the season. Later in the year White Fly was seen in the Nduli area of Iringa.

Tea Pests.—A severe outbreak of cut worms did extensive damage to the young tea trees in the Mufindi area in October and November and the Entomologist, Morogoro, was called in to advise on control methods.

Soil Conservation Measures

Native Areas.—Throughout the Province the Instructor staff continued to advise the African on routine soil conservation measures, with varying degrees of success. An examination of the existing measures early in the year soon revealed that the present measures were inadequate to prevent erosion, especially in the higher areas of the Mbeya, Rungwe and Njombe districts. Consequently the whole organization for this work was radically overhauled. New and more comprehensive legislation was drafted and has been submitted to the Governor for his approval, and arrangements have been made to train a special cadre of Instructors for each district. The native authorities of each district have been asked to vote £350 per annum towards this African staff in order to assist the African cultivator to lay out his fields in the proper manner. The new Provincial Soil Conservation Rules are given in Annexure IV.

Non-Native Farms.—It is unfortunately still true that the average non-native farmer gives no lead whatsoever to the African in the matter of soil conservation. In many areas the African's methods are infinitely superior to

those of his European and Asian counterpart, and it is disappointing to record that even when assistance was given with the demarcation of contours, little or nothing has been done.

Experimental Work

Iheme.—The Experimental Station was virtually closed, except for the Pig Unit. A small amount of orchard nursery work was undertaken. The Station was used mainly for the production of green fodder for the pigs. In the latter part of the year the orchards were renovated, manured and mulched.

An Italian co-operator was stationed at Iheme for four months and during that period the houses and offices were repaired, white-washed and painted. Other buildings also received attention.

The Sub-Station, Lyamungu (at Mbosi).—The coffee trees on this plot, due to the lack of adequate supervision and care, carried an excessive crop, and consequently suffered severely from leaf fall and die-back. Two varieties withstood the maltreatment and are outstandingly good. These, together with other selections, are to be tried out in a variety trial. A complete re-organization of this Sub-Station's programme of work is under consideration.

The Demonstration Plots at Tukuyu were maintained. Demonstrations of soil conservation measures, the growing of Tung Oil, Oyster Nuts, Queensland Nuts, Cinchona, Oil Palm, Coffee and other annual crops were given.

The Songea Native Authority Seed Farm produced selected tobacco seed for distribution to the native growers. A scheme for the re-oganization of this Farm was worked out during the year, whereby the number of stock was to be increased for the production of milk and manure, the latter for the manufacture of compost for the maintenance of soil fertility.

Nicotine Extract Tobacco Plots, Mbeya.—Tobacco growing trials for the production of nicotine extract were planted in the Mbeya District. Ten plots in all have been laid down at different elevations.

Tobacco Variety trials, Iringa.—A simple variety and fertilizer trial has been laid down in the Iringa District. Details of the varieties are given above in the section dealing with tobacco.

Potato plots, Mporotos, Mbeya.—The Agricultural Officer, Mbeya, reports: "At the instance of the Native Authorities, five small plots were planted to European potatoes in the Mporotos to demonstrate that, with spraying, potatoes can be kept free from blight. So far the plots have been a success, but it is to be regretted that the potatoes in one plot were uprooted and stolen."

Flax Trials, Mbeya.—The Agricultural Officer, Mbeya, reports: "An experimental plot of 20 acres of flax was tried out on an European owned farm near Mbeya and is reported to have been successful. No details of the results are available." To test out the possibilities of flax as an African cash crop, four plots have been selected and prepared at different places for the trials of this crop during the coming year.

Cultivation and Manurial Trials, Iringa District.—On the recommendation of Dr. Duthie, Soil Chemist of the Amani Institute, a series of soil cultivation and manurial trials were started, and one trial has been completed at Mufindi. The remaining trials at Rungemba (Sao Hill area) and at Mwitu in Lower Dabaga, are being carried out.

The six treatments are on 5-acre plots of :—

Cultivation Treatment		Manurial Treatment
1. Sub-soil ripping to depths of 14 inches		No manure.
2. ,, ,, ,, ,, ...		Plus 2 cwts. Uganda rock sulphate.
3. ,, ,, ,, ,, ...		Plus 1 ton unburnt lime.
4. ,, ,, ,, ,, ...		Plus 2 cwts. phosphates and 1 ton lime.
5. No cultivation. Acre plots of	(a)	2 cwts. rock phosphate.
	(b)	4 cwts. Mbeya guano.
	(c)	1 ton lime.
	(d)	2 cwts. rock phosphate and 1 ton lime.
	(e)	No treatment.
6. Control plot. No cultivation		No manure.

After treatment the six 5-acre plots will be left for a period of years to see the effect on the natural grass covering. Grazing of crop trials may be superimposed at a later date.

Iheme Pig Unit

In July the decision was made to close down the Iheme Pig Unit and to dispose of the pigs. Annexure V gives a statement of the deliveries to the Ulete Bacon Factory and sales to farmers.

With adequate local foodstuffs and plenty of green fodder the baconers sent to the Ulete Factory were reported to be of high class quality.

Meetings

The Acting Senior Agricultural Officer attended, at various times throughout the year, meetings of the Tea Board, Pyrethrum Board, the Southern Highlands Non-Native Tobacco Board, the Songea District Native Tabacco Board, and the Iringa District Production Committee.

The Iringa District Production Committee

The Committee functioned throughout the year. Orders for the production of food crops were given, and cultivation and machinery loans were arranged on behalf of farmers. The Committee has served a most useful function and, as previously stated, the non-native production of maize in the Iringa District of over 1,100 tons saved the Province from a serious food shortage.

During the year it was decided to close down the Pawaga Irrigation Scheme.

Acknowledgments

I should like to extend my thanks to all officers in the Province for their very willing help. In every phase of agricultural activity officers of the Provincial Administration and all other Departments have taken interest in, and have given their fullest support to, our own thinly spread staff, and their co-operation is gratefully acknowledged.

J. G. M. King,
Acting Senior Agricultural Officer,
Southern Highlands Province

Annexure I

RAINFALL

Station	Rainfall for the year in inches	Averages	No. of years recorded
Mbeya	39·57 ...	36·7 ...	15
Tukuyu	129·33 ...	100·06 ...	26
Njombe	45·7 ...	41·7 ...	17
Iringa	35·79 ...	30·17 ...	15
Songea	63·09 ...	44·07 ...	29

Annexure II

PRODUCE PURCHASED—BY DISTRICTS

	Iringa T.	Mbeya T.	Rungwe T.	Songea T.	Total T.
Maize	2,143 ...	1,554·7 ...	337 ...	50 ...	4268·7
Paddy	50 ...	— ...	1,104 ...	62·3 ...	1,216
Coffee	— ...	54 ...	194 ...	15·8 ...	273
Tobacco	— ...	— ...	— ...	160 ...	160
Potatoes	— ...	29·7 ...	3·7 ...	21·6 ...	56
Beans	60 ...	123·7 ...	18 ...	39·7 ...	242
Millets	— ...	155·4 ...	14 ...	165·3 ...	335
Wheat	— ...	— ...	— ...	577 ...	577
Cassava	— ...	— ...	8 ...	157 ...	165
Pulses	6½ ...	— ...	— ...	— ...	6
Banana Flour	— ...	— ...	10 ...	— ...	10
Onions	— ...	— ...	1·2 ...	8·3 ...	10
Beeswax	— ...	— ...	1 ...	33·2 ...	34
Groundnuts	— ...	— ...	1·8 ...	57 ...	59
Sesame	— ...	5·2 ...	— ...	116 ...	121

NATIVE GROWN COFFEE STATISTICS—MBOSI AND RUNGWE

Rungwe	Grade A			Grade B			Grade C		
	Kilos	Shs.	Cts.	Kilos	Shs.	Cts.	Kilos	Shs.	Cts.
Mwakalile	84,925	72,176	05	4,929	2,218	50	459	91	70
Suma	20,887	17,752	30	4,970	2,231	25	439	87	20
Tukuyu	15,503	13,177	10	4,394	1,976	80	935	187	10
Rungwe	31,937	27,145	55	2,639	1,187	40	585	117	20
Seso	16,533	14,052	55	3,365	1,514	25	170	34	00
Total ...	169,785	144,303	55	20.297	9,128	20	2,584	517	20

Totals—Kilos 194,666 = Shs. 153,948/95. This constituted a record for the Rungwe Area.

Comparative figures—Parchment Coffee

1944

Market figure: 183·4 tons parchment
% A 91·13 ... % B 7·85 ... % C 1·02
By Factory returns: 177 tons.

1945

Market figure: 194·6 tons parchment
% A 87·70 ... % B 11·30 ... % C 1·00
By Factory returns: 203 tons.

Factory Returns (Cured Coffee)

	1944 Kilos		Per cent		1945 Kilos		Per cent
A Grade	69,000	...	41·03	A Grade	73,205	...	43·23
B Grade	58,807	...	34·96	B Grade	72,062	...	42·56
C Grade	15,912	...	9·46	C Grade	7,995	...	4·72
P.B.	10,910	...	6·49	P.B.	8,803	...	5·20
T.	1,631	...	·97	T.	540	...	0·32
T.T.	933	...	·6	T.T.	583	...	0·34
H.P.	10,983	...	6·53	H.P.	6,153	...	3·63
	168,176	...	100·00		169,341	...	100·00

Percentage loss in milling: 15·27. Percentage loss in milling: 15·47.

N.B.—The above figures do not include the final 3 tons of parchment.

Mbosi:

Year	No. of Growers	Weight Bought Kilos	Bearing Coffee Acreage	Total Acreage	Yield Kilos per acre parchment
1943	360 ...	18,186 ...	556 ...	582 ...	32·7
1944	330 ...	31,307 ...	553 ...	601 ...	56·9
1945	377 ...	54,885 ...	577 ...	723 ...	75·9

The purchases as graded at the markets were:
No. 1: 47,102 kilos = 86·34 per cent.
No. 2: 3,373 kilos = 6·08 per cent.
No. 3: 4,110 kilos = 7·59 per cent.
Average production per native grower was 179·95 kilos.

SOUTHERN HIGHLANDS PROVINCE

Soil, Water and Forest Conservation Rules

1. A Native Authority may demarcate any area of land within which the planting of crops and the felling of trees or lighting of any fire shall be prohibited; provided that no land shall be so demarcated unless it borders upon a stream, spring or dry river bed or road; or unless it is eroded; or unless it is land from which the water run-off causes or threatens to cause soil erosion on the land immediately below it: or unless it bears useful forest.

2. A Native Authority may prohibit the grazing of cattle, sheep or goats within any area demarcated in accordance with Rule I.

3. No person shall cultivate land or cut trees within an area demarcated in accordance with Rule 1 above unless he is permitted by the Native Authority to do so.

4. The demarcation shall be by marks visible one to the other along the line of the boundary. These boundary marks shall, in the first instance, be made by the soil conservation instructors working under the Native Authority and afterwards maintained by the occupier of the land adjoining the boundary. It is an offence for these boundary marks to be moved or destroyed.

5. Any person cultivating sloping land for the first time shall, when clearing, place all debris along the contour in lines, until such time as further instructions are received from the Native Authority.

6. The occupier of any cultivated land which is, in the opinion of the Native Authority, insufficiently protected from soil erosion, shall take such action to prevent soil erosion as the Native Authority, in consultation with an Agricultural Officer, may direct.

7. For the purpose of Rules, 5 and 6, a Native Authority, in consultation with an Agricultural Officer, may order the construction of contour ridges of such size and material as may be ordered by the said Authority.

8. Where, on any land, work has been done in conformity with directions given by a Native Authority under these rules to prevent soil erosion, the occupier of the land shall maintain such work.

9.—(a) For the improvement and maintenance of soil fertility a Native Authority may order that all cattle manure shall be used on cultivated land.

(b) To increase the supplies and quality of cattle manure the Native Authority may order cattle owners to use grass and/or plant residues as bedding in cattle bomas.

(c) In order to improve grazing the Native Authority may order all or any members of the native community entitled to use grazing areas to assist in the weeding of them.

10. A Native Authority may order the early burning of grass for the conservation of pasture, and may promulgate the date by which the burning must be completed.

11.—(a) No native may burn grass or bush on his own cultivated area without notifying and receiving permission from his Native Authority. Such permission may not be given until the Native Authority has satisfied itself that a fire line sufficient to prevent the fire spreading has first been made.

(b) No native may under any circumstances light a fire or fires outside his own cultivated area except as provided for by Rule 10.

(c) It is the duty of every native, on being so ordered by his Native Authority, to assist in extinguishing any fires that may break out either on public lands or in forest reserves.

12. Any person contravening any of the provisions of these Rules or any orders made under these Rules shall be guilty of an offence and shall be liable on conviction to a fine not exceeding one hundred shillings or to imprisonment with hard labour for a period not exceeding two months or to both such fine and imprisonment.

13. A court may, in addition to any other punishment which it is empowered by rule 12 to award:—

(a) prohibit a person found guilty of an offence against these rules from cultivating the land in respect of which the offence has been committed until such time as the Native Authority of the area shall certify that the breach of the rule has been made good;

(b) order such person to uproot and, if necessary, burn any crops, trees or plants planted by him in contravention of these Rules;

(c) order such person to plant such trees or plants as it considers necessary on the land in respect of which the offence has been committed.

IHEME PIG UNIT

A.—Details of Baconers sent to Ulete Bacon Factory.

Month	No. of Baconers	Weight lb.
January	31	4,656
February	29	4,362½
March	10	1,479
April	18	2,887
May	16	2,472
June	22	3,310
July	56	9,363
August	43	8,274
September	44	6,850
October	39	6,502
November	20	4,267
December	11	1,008
	339	55,440½

B.—Other Pigs sold to Farmers.

Month	Gilts (young pigs)	Sows	Baconers Boars and Weaners		To whom sold
January	5	—	—	—	Mr. A. Ghaui.
August	1	—	—	—	Mr. L. H. Frey.
October	6	—	—	—	Mr. Chelestino.
,,	—	3 and 12 sucklings	—	—	Brigadier Scupham.
,,	4	—	—	—	Mrs. Lombard.
,,	8	—	27	—	Mr. Mavoroudis.
,,	—	—	1	—	Mr. Douglas.
November	—	—	18	—	Sundry Africans.
,,	—	1	9	—	Mr. Sale Hadji.
,,	—	—	1	2	Peramiho Mission.
December	—	2 and 15 sucklings.	—	—	Mr. H. Constantinides.
,,	—	2 and 20 sucklings.	—	—	Mr. G. Zanettos.
,,	—	—	6	—	do.

In July and September two baconers were fed each month as rations to labourers.

ANNUAL REPORT OF THE TANGA PROVINCE, 1945

Staff

The permanent European agricultural staff of the Province in 1945 consisted of a Senior Agricultural Officer stationed at Lushoto and an Agricultural Officer at Tanga. The Senior Agricultural Officer, in addition to his normal provincial duties, supervised agricultural activities in the Korogwe and Lushoto divisions whilst the Agricultural Officer, Tanga, was responsible for the Tanga and Pangani districts. Pare District received only brief sporadic visits from the Senior Agricultural Officer and Handeni was visited on four occasions by the Agricultural Officer, Tanga.

Temporary European staff consisted of a Cotton Supervisor in Pare, a Crop Supervisor in Tanga for four and a half months and a temporary Crop Supervisor in charge of the Department's vegetable grading depot at Soni (Lushoto) for seven months.

Details of European staff working in the Province during the year are as follows:—

Tanga: H. Doggett, Agricultural Officer, 1.1.45-29.1.45, 26.9.45-31.12.45; J. Alexiou, Crop Supervisor, 1.1.45-14.5.45.

Lushoto: R. D. Linton, Senior Agricultural Officer, 1.1.45-13.7.45, 23.11.45-31.12.45; H. Doggett, Agricultural Officer, 29.7.45-25.9.45; J. V. R. Brown, Senior Agricultural Officer, 23.9.45-27.11.45; A. Makins, Crop Supervisor, 1.1.45-31.7.45.

Pare (Gonja): A. E. Papadakis Cotton Supervisor, 1.1.45-31.12.45.

A summary of official touring by European staff is attached to this report.

Three Grade III African Instructors were in employment during the year, one each at Lushoto, Handeni and Same. Men of the required standard were not available to fill the six vacant posts. The average establishment of junior native field staff during the year was as follows:—

	Permanent	Copra	Temporary	Native Authority
Tanga-Pangani ...	11	16	13	—
Korogwe-Lushoto ...	19	—	15	10
Handeni	9	—	5	2
Pare	9	—	8	—
	48	16	41	12

One Lushoto Instructor graduated from Ukiriguru school during the year, taking 14th place, and a second candidate from Same for the 1944/45 course failed in his preliminary examination and was returned to his district. There are now four Ukiriguru-trained Instructors in employment in the Province and a fifth from Same was dismissed after successfully completing the course in 1943. There are six Instructors at present in training at the school. Two Copra Instructors from Tanga visited Zanzibar for a month's tuition in copra grading.

Efforts made during the year to raise the standard of the Instructor staff by recruiting only well educated schoolboys have met disappointing results. These boys tend to evade the hard life and walking involved in the work of an Instructor and their over-patronising manner towards the uneducated peasantry does not make for efficient working. Dismissals have been frequent in consequence, but it is logical to assume that the few who stand the pace should eventually be more valuable than the semi-literates of which the existing establishment is mainly composed.

Weather Conditions

The main rains of 1945 were unusually late and in most parts of the Province planting of annual crops only became possible towards the end of April. The late planting season was followed by a very dry June, the net result being that crop yields in general were poor. The only exceptions were on the mountain slopes south of Lushoto and in the Nguu country of Handeni, where February planting was made possible by early rains.

The 1945 short rains were late, and precipitation in the Pares and North Lushoto area was satisfactory up to the end of the year. In the East Usambaras and in Tanga and Pangani the short rains were an almost complete failure.

The following is a summary of the rainfall during the year at the principal recording stations, the averages for the previous year's being shown in brackets :—

Rainfall in Inches

	Tanga	Korogwe	Same	Lushoto
January	3.74 (1.51)	2.45 (1.96)	2.16 (1.11)	3.4 (2.92)
February	0.76 (2.53)	0.24 (1.37)	—)2,49)	3.15 (3.05)
March	4.08 (6.03)	5.03 (4.50)	1.48 (3.88)	4.90 (5.17)
April	4.51 (8.87)	2.97 (10.99)	3.24 (5.25)	3.90 (9.11)
May	18.05 (12.87)	11.57 (12.81)	4.94 (3.14)	12.14 (6.88)
June	2.57 (3.36)	1.66 (3.38)	0.15 (0.22)	2.27 (2.23)
July	1.51 (1.96)	2.25 (1.16)	— (0.06)	0.97 (1.33)
August	1.27 (2.84)	1.05 (2.24)	— (0.93)	0.45 (0.83)
September	3.19 (3.36)	2.10 (1.87)	0.2 (0.47)	0.77 (0.50)
October	2.18 (3.99)	— (2.75)	— (0.94)	0.62 (1.26)
November	3.16 (3.87)	2.05 (2.05)	2.75 (2.29)	2.76 (3.86)
December	1.33 (2.90)	1.18 (2.52)	2.95 (2.93)	3.32 (4.67)
	46.35 (54.09)	32.55 (47.60)	17.87(23.71)	38.65 (42.35)

Crop Production

General.—The food production drive in 1945 followed similar lines to that adopted in 1944 whereby emphasis was laid almost entirely on root crop planting. This policy has proved to be a very sound one and in 1945/46 it will preclude the necessity for large scale food imports for native areas which would otherwise have had to take place owing to the partial failure of the 1945 grain harvests. As it is, the Tanga Province is importing food at the rate of 1,500 tons a month, mostly for estate labour, and this figure might readily have been double had the natives in the reserves been allowed to concentrate all their energies on maize.

A fairly severe food shortage was again experienced during the first half of 1945 in the northern chiefdoms of the western Usambaras where unsatisfactory short rains in 1943/44 resulted in a much reduced maize crop. The

position was alleviated in the extreme north-west by 1,000 people descending to the lowlands at Mkundi for maize planting during the long rains of 1944, where they reaped an excellent harvest. The majority of people, however, had to purchase imported food or obtain their requirements in exchange for services outside the division.

A further food shortage is now imminent in the same area but, unfortunately, on a wider and more acute scale. The 1944/45 short rains in the highlands were below normal and the long rains in the lowlands were poor so that by the end of 1945 food reserves in the northern chiefdoms were very low indeed. The position will continue to deteriorate till the next short-rains' harvest in June. Dry weather and the threat of locusts do not augur well for this and it is quite possible that the whole area may be short of food till the middle of 1947.

The population of the area under discussion has now experienced semi-famine conditions for three years running and it is difficult to see any prospect of self-sufficiency in the future except in occassional years of ideal rainfall. The hard facts are that the whole region has reached a very low level of fertility owing to over-cultivation, over-grazing and failure to manure the land; and progressive erosion and deforestation have led to excessive run-off of water. In the long run these conditions can only be rectified by a vigorous soil-rehabilitation programme and a reshuffle of the human and cattle populations.

Localized food shortages have also occurred in the Pares and Tanga but have not been serious, as cassava has been readily obtainable from nearby villages. Small scale importations of food for natives have had to be resorted to in these districts.

The total imports of staple grains into the Province in 1945 totalled 16,700 tons compared with 10,000 tons in 1944. The bulk of the increase is attributed to the reduction of the acreage of estate maize and to the very poor crops reaped by those who did plant.

Root Crops.—As already stated the main emphasis in native production was laid on the planting of root crops and very satisfactory cassava plantations now exist in most parts of the Province. The chief danger spot is still Handeni where cuttings of cassava had to be imported in 1944 and where many families rely entirely on maize planting, a crop which frequently fails through drought. Large reserves exist in the north end of the Luengera valley and in Pangani and in the former area the crop is a very important source of income. Besides selling large quantities of dried cassava to hungry natives in the Lushoto and North Tanga regions the inhabitants of the North Luengera sold nearly 400 tons to Tanga traders.

Sweet potatoes were planted extensively in all districts towards the end of the rains but dry conditions and lack of irrigation water resulted in very small harvests.

Maize.—It was an unusually bad year for maize, very late planting rains followed by drought conditions in June. The only exceptions were the mountain slopes south of Lushoto and a few parts of Handeni, where planting was possible in February and very good harvests were realised.

The number of non-native maize growers dropped from thirty to twenty and the total acreage from 15,000 to 5,500. The total estimated harvest was

800 tons compared with 4,000 tons in 1944. Even allowing for wide spacing and the fact that most of the crop was planted in sisal, the very low average yield of one and a half bags per acre provides a good example of the danger involved in relying entirely on maize as the staple food crop.

A sum of Shs. 30,502/50 was paid in maize grants to non-native growers in respect of 4,067 acres.

The 1945/46 short rains' maize crop was late-planted and prospects everywhere are extremely poor owing to dry weather and the danger of locust damage. In the coastal regions the crop has failed completely.

Rice.—Rice production in the Province has shown a further regrettable decline, attributed mainly to increased employment in the sisal and rubber industries. Whilst there is no doubt that this is a very important factor there is at the same time plenty of evidence to show that large numbers of unemployed have also abandoned the crop—probably because the large sums of money flowing into the rural areas in the form of wages and remittances have removed the incentive to grow crops for cash. The domestic situation in the Pares arising out of the new method of taxation has probably had a further depressing effect on production in that district. Efforts to resuscitate rice growing by compulsion under the Native Authority Ordinance have met with little, if any, success.

The following table gives an indication of the trend of rice production over the past few years :—

Sales of Paddy in tons

	Pare	Korogwe	Total
1942 ...	2,120 ...	580 ...	2,700
1943 ...	1,370 ...	390 ..	1,760
1944 ...	745 ...	135 ...	880
1945 ...	606 ...	159 ...	765

Wheat.—Efforts to establish wheat as a food crop in the highlands north of Lushoto have made very little progress owing to the fact that since the crop was introduced in 1941 there have been recurrent food shortages in the area and seed reserves have been methodically consumed. It has been necessary therefore to import fresh supplies of seed every year and the number of people who are able to pay for such seed, with its heavy transport costs, is limited.

Beans.—The native bean crop, both from the 1944/45 short rains and the 1945 long rains, was small owing to drought and disease. The only place which produced an appreciable saleable surplus was the Luengera valley where the crop is planted in seepage areas after the long rains and where 67 tons were marketed out of a total of 95 tons for the whole Province.

In the Lushoto division 300 acres of beans were planted by non-natives under the Increased Production of Crops Ordinance but owing to infertility of the soils, coupled with inadequate rains and an unduly high incidence of disease, the crop was negligible.

Potatoes.—There has been no revival of potato growing among natives nor is there likely to be unless a really blight-resistant variety can be found and multiplied up. There appears to be little or no trouble with blight during the short rains but it is extremely difficult to store the seed supply from one short rains crop to the next. Part of last long rains European-grown crop

(sprayed) was distributed to natives for short rains planting but an extension of this procedure on a large scale is hardly feasible as few natives could afford to buy expensive European-grown seed every year, particularly as the short rains crop is unreliable owing to the uncertain rainfall.

In blight observations which have been proceeding over the past three years at Lushoto the highest yielder in a good year appears, with little doubt, to be Kinongo (a variety imported from Kenya and now identified as Northern Star). It is however somewhat drought-susceptible and does not possess any very marked resistance to blight and if a crop is to be assured spraying must be properly carried out. The most blight-resistant of the local varieties (also represented in Kenya) is Skerry Blue but the tubers are unattractive and frequently misshapen and would have no appeal as a marketable potato. The variety may, however, be worth multiplying up as a native food crop.

The variety 914, of which only three tubers were received, was planted for the first time in May 1945 and remained entirely free from blight up to harvest time, although the varieties surrounding it succumbed completely. It would be unwise however to assume from this that the variety is immune as blight did not make its first appearance till nearing harvest time. The yield from the three tubers totalled four and a half pounds (37 tubers) but only 16 tubers were sufficiently advanced for short rains planting. Ten recently harvested plants yielded twenty pounds (109 tubers) and indications are that there will be sufficient seed to raise 150 plants (exclusive of further imports) during the next long rains. With heavy manuring, reasonable weather, reasonable freedom from pests and disease and, of course, proper care and attention there should be at least one ton of seed available in a year's time.

Vegetables.—Railings of fresh vegetables from the Usambaras totalled just over 625 tons compared with 1,000 tons in 1944 and 1,100 in 1943. The reduction is due chiefly to the termination of the contract between the Department and the War Supplies Board, Nairobi, at the end of May. Sales to the Board totalled 500 tons in each of the years 1943 and 1944 and only 102 tons in 1945 (to the end of May).

The Suspense Account in connection with the supply of vegetables to Nairobi closed with a credit balance of £500, the disposal of which is still under consideration.

Conditions for vegetable production at the end of 1945 were very poor owing to lack of rain, and prospects for out-of-season vegetables (that is during the first six months of 1946) were the worst for some years past.

Nearly 200 lb. European vegetable seeds and 180 lb. onion seeds were sold through the Lushoto office during the year, mostly in the form of small packets. This service throws a good deal of extra work on the clerical staff but none of the local shops is prepared to undertake it. As reported last year efforts to produce vegetable seeds at Tema, north of Lushoto, were frustrated by the depredations of native thieves who stole the vegetables on maturity. However, a patch of tropical cauliflowers escaped as the heads, at an altitude of 6,000 feet, were too small to be worth cutting and eight pounds of seeds were ultimately harvested.

Citrus.—Dry weather at the end of 1944 resulted in a considerable reduction in the number of oranges produced in the Muheza area but as the size of the individual fruit was very much larger than in 1944 (5,300 pieces to the

ton compared with 6,500) the actual tonnage was only 60 tons below the 1944 figure of 1,549 tons. Purchase by weight was introduced at the markets, the price per pound being calculated on the previous year's basis of Shs. 6/- per thousand at Muheza and 6,500 oranges to the ton. The fact that the 1945 main-crop orange was about 22 per cent heavier than its 1944 prototype meant that the grower received some 22 per cent more than he would have received had his oranges been purchased by count. This fact, whilst doubtless proving very satisfactory to the producer, considerably reduced the profit on the year's working.

The principal consumers were the East African War Supplies Board although their requirements were very much reduced on previous years (in 1944 they took 82 per cent of the crop) and there was a balance for disposal to the Kenya public after satisfying the Tanganyika demand. The agents are now engaged on exploring the possibilities of expanding the Kenya civilian market in anticipation of the cessation of Supplies Board purchases.

The following is a summary of marketing statistics during the past three years :—

	1943	1944	1945
Total purchases, tons	2,000 ...	1,549 ...	1,490
Total puchases, pieces	— ...	10.068,935 ...	7,878,145
Price to grower, per 1,000	Shs. 3/- ...	Shs. 5/56 ...	Shs. 6/80
Price to grower, per 100 lb. ...	— ...	Shs. 1/61 ...	Shs. 1/61
Wastage during marketing	50% ...	17·75% ...	17·90%
Total payments to growers	— ...	£2,803 ...	£2,680
Net profit	— ...	£807 ...	£759

Although a good crop of fruit has set for 1946 the very dry conditions prevailing during the latter part of the year will probably result in depressed yields.

Special attention was paid to the cleaning up of citrus orchards and the removal of the parasitic weed Loranthus. Twenty-six prosecutions were necessary during the course of this work.

Other Fruit.—Pangani District exported 1,200 tons of bananas during the year, mostly to Mombasa. One hundred and thirty tons of fruit, mainly plums and peaches, were railed from the Lushoto area and railings of mangoes, bananas, etc., from Muheza totalled 800 tons. Betel nut exports from Pangani amounted to 815 cwt. compared with 1,856 cwt. in 1944.

Coconuts.—Copra sales in 1945 totalled 3,804 tons compared with 3,494 tons in the previous year. The voluntary system of copra grading at the Tanga mill instituted in 1944 was maintained throughout the year but for various reasons results have not been encouraging. For one thing the existing grades permit of high moisture contents in the lower grades and the additional weight of such moisture compensates the seller to a large extent for the lower price per frasila. The only satisfactory method of circumventing this is to insist on a uniform (fixed-maximum) moisture content for all grades, but until grading becomes possible at the original point of sale it is difficult to insist on a high degree of dryness. It is obvious too that producers who sell through middlemen are in many cases not receiving the appropriate prices according to grade and here again the only satisfactory solution is grading at the producer end. On the credit side the African Instructors and traders are gaining some knowledge of the methods and implications of grading which will simplify the introduction of the more stringent measures which will be necessary with the application of the Copra Ordinance.

Draft Copra Rules under the Copra Ordinance, controlling the grading and marketing of copra, have been drawn up and submitted to Government but it may not be possible to implement these satisfactorily until the removal of wartime controls over movement and export. The Agricultural Officer, Tanga, is at present engaged on the selection and demarcation of markets which will be necessary for the operation of the Rules.

Coconut sanitation work made good progress during the year and numerous barazas were held by the Agricultural Officer and officers of the Administration to stress its importance. There were 407 convictions in the courts for offences under the Coconut Rules.

Twenty-five notices were served on non-native coconut owners and it is likely that several prosecutions will be necessary in 1946. In referring to one European-owned plantation is particular the Agricultural Officer, Tanga, writes :—

> "This estate is recorded as being in a disgraceful condition for at least the past sixteen years. The lessee in 1945 did a certain amount of cleaning work under pressure from this office, but there are 3,300 dead trees, 2,300 diseased trees and about 3,500 logs and 3,000 stumps to be attended to. The estate has been very co-operative in the matter and from the beginning of 1946 new lessees will take over the shamba, having agreed to put it back into clean condition instead of paying any rent, which task will take them a full two years. The new lessees are a group of four Africans working in partnership, who have also purchased three kilns, and their progress during the next two years will be watched with interest."

1,527 coconut seeds from selected mother palms were planted in nurseries at Pangani and these will later be planted out on a block of land recently acquired for the purpose. The seed is the progeny of forty-three trees which have each yielded over eighty nuts per annum over the past five years.

Palm Oil.—Production of palm oil in the Eastern Usambaras totalled 27 tons and palm kernels 18 tons.

Tung Oil.—The one and a half tons of tung oil produced in 1944 from the collective harvest of nuts from the three producing estates remained unsold at the end of 1945. The producers could have marketed the oil in the United Kingdom at a price of £190 per ton f.o.b. but as Nyasaland oil was fetching £249 on the South African market the producers were reluctant to accept the lower price. Information has now been received that owing to plentiful supplies being available the South African demand has declined and oil is on offer at £200 per ton c.i.f. The producers are now arranging to ship the local stock of oil to the United Kingdom to be sold for what it will fetch. A further one and a half tons of oil was produced in 1945, making a total of some three tons now available.

Essential Oils.—During the year 7,400 lb. of bitter orange oil was produced on Sigi Segoma Estate.

Coffee.—The following are the railings of parchment coffee from the Usambaras during the past ten years :—

	Tons		Tons
1936 ...	156	1941 ...	99
1937 ...	139	1942 ...	170 (20 tons native).
1938 ...	127	1943 ...	70 (8 tons native).
1939 ...	107	1944 ...	133 (17 tons native).
1940 ...	70	1945 ...	150 (40 tons native).

Generally the crop is railed during the first two months of the year and in most cases the railway returns represent the crop for the previous year.

The quality of the 1944/45 native crop was below average owing to damp weather during picking and the fact that growers were not equipped with sufficient pulpers and drying trays to handle a crop of forty tons. The crop was, as usual, sold through the Kilimanjaro Native Co-operative Unit under the supervision of the Agricultural Department.

The 1945/46 crop is small; native production is expected to be about 30 tons and non-native 50 tons.

Tea.—The failure of the 1945 short rains resulted in a further drop in the output of the Ambangulu factory to 398,000 lb. With reasonably satisfactory weather the yield of made tea from Ambangulu and the neighbouring estate of Sakarre should now be of the order of 600,000 lb. The following are the production figures of made tea from the Ambangulu factory over the past ten years :—

	lb.		lb.
1936 ...	98,925	1941 ...	337,337
1937 ...	157,716	1942 ...	568,202
1938 ...	240,020	1943 ...	470,452
1939 ...	309,120	1944 ...	411,000
1940 ...	324,602	1945 ...	398,000

A further planting of 130 acres took place on Derema estate bringing the acreage there to 162. All tea estates in the Usambaras were visited and reported upon in November by Mr. F. W. Thomas, Agricultural Officer.

Cocoa.—The production of cocoa at Sigi Segoma amounted to just over four tons.

Condiments.—Four tons of black pepper, 450 lb. white pepper and 11 tons capsicums were produced on Sigi Segoma estate. Two other estates produced one and a half tons of chillies between them, a crop which before the war was of considerable importance.

Papain.—A total of 2,500 lb. of papain was produced by three estates in the Province.

Cinchona.—The production of quinine bark was 71 tons compared with 60 tons in 1944. Considerable increases in acreage took place.

Tobacco.—Railings of native air-cured tobacco from the highlands north of Lushoto were again well above average and amounted to 75 tons compared with 122 tons in 1944. Most of the tobacco went to Tanga and it is estimated that the income to the growers was £3,000.

Sisal.—Sisal production was 3,000 tons short of the original target of 62,000 tons, and 400 tons down on the record year of 1944. The main factor militating against maximum output was labour shortage and in a few cases there was a shortage of water for decortication towards the end of the year. Supplies of machinery and transport for the industry were fairly satisfactory.

The continuance of very dry conditions up to the end of December, coupled with the loss of conscripted labour in the near future will probably result in a drop in production in 1946.

The production of fibre in the Tanga Province during the past four years was :—

	Tons		Tons
1942 ...	53,762	1944 ...	59,693
1943 ...	55,532	1945 ...	59,285

Cotton.—There was a further drop in the acreage and output of cotton in the Province, particularly in Pare District where only just over eight hundred natives planted the crop. The reasons for the decline may be taken as substantially the same as those already given for the decline in rice production and in 1945 unfavourable weather was a further contributory factor. Production statistics for 1945 and comparative figures for previous years are as follows:—

1945 Seed Cotton (Tons)

	A	C	Total
Pare	40	12	52
Handeni	19	5	24
Korogwe	12	2	14
	71	19	90 = 159 bales.

Shs. 23,414/59 paid to growers.

1940-1945 Seed Cotton (Tons)

	1940	1941	1942	1943	1944	1945
Pare	1,323	480	1,078	442	335	52
Handeni ..	1.105	890	155	153	35	24
Korogwe ..	305	171	259	127	50	14
	2,733	1,541	1,492	722	420	90

Kapok.—Exports of kapok from the Province amounted to 180 tons compared with 112 tons in 1944. Actually the 1945 crop was even smaller than the export figures indicate and some plantations reported no crop at all owing to the excessive rain and stormy weather of September-November 1944 having destroyed the flowers. Many of the old German plantations are completely neglected and even where these are leased there is little inclination to keep the kapok clean, as the price of the product is considered to be too low to permit of this.

Rubber.—The production of Ceara rubber rose from 1,240 tons in 1944 to 1,700 tons, this probably being the maximum obtainable from the 30,000 acres in the Province. The trees are all at least thirty years' old but in spite of this they have stood up well to constant tapping over the past two and a half years. Nearly two tons of Hevea rubber were produced at Sigi Segoma.

Derris.—Derris root exports amounted to 39 tons compared with 16 tons in 1944 and 15 tons in 1943. Practically all of it was produced by four estates in the Tanga Province. The present plantings of this crop in the Province are computed to amount to nearly 200 acres so that, provided a profitable market continues, an output of at least 30 tons a year for the next four years should be maintained.

Soil Conservation

In the Western Usambaras African Instructors accurately demarcated some 250 miles of contour guide lines during the year and many hundreds of miles of live contour hedges were planted, but because of this it cannot be said that the soil and fertility conservation problems have become any the less acute. On the contrary, the rate of soil destruction and loss of fertility is far outstripping the present rate of amelioration and without drastic action, involving a reduction in the land under cultivation in the overcrowded areas, stabilization of the position cannot be reached. Increase of population, coupled

with reduced crop yields, has led to more extensive cultivation and consequently less grazing, with the result that cattle owners are obliged to drive their herds of cattle, sheep and goats into the arable fields as soon as the crops are off. The effect of all this is that it has become almost impossible to establish new contour hedges and those which had already established themselves are being gradually trampled out of existence or being undermined by the cultivators themselves in their endeavours to get a hoe into every possible square inch of land. A great deal of land in the northern sub-chiefdoms of Lushoto division has already become completely denuded of vegetation and top soil and is useless for either cultivation or grazing and unless some means can be found to rouse the population to the danger and induce them to take sterner measures there is no doubt that the process of destruction will grow with increasing momentum and that extensive areas will have to be abandoned.

Immediate ameliorative measures that suggest themselves are prohibition of cultivation near contour hedges and prohibition of grazing on arable land. Such measures will naturally reduce the areas available for cultivation and grazing but will automatically tend to force the population to manure the land and cut and carry fodder for the cattle, both of which practices must eventually figure in any land utilization policy designed to support the maximum population on a permanent basis. Intensive propaganda on these lines during the past few years has achieved nothing and it is evident to anyone familiar with the area and its people nothing will be achieved unless such propaganda is backed by the force of law. To implement this suggestion comprehensive land utilization rules are required enabling suitable curative measures to be adopted and enforced piecemeal in any particular area according to local circumstances and requirements. Draft rules of this type have been drawn up and approved by the Provincial and Native Administrations as well as all the Provincial technical representatives concerned and have been sent forward for the approval of the Governor.

During December a representative meeting of Adminisrative and Departmental Officers presided over by the Provincial Commissioner was held at Lushoto to consider a scheme for the rehabilitation of the Mlalo basin put forward by Dr. F. J. Nutman. This scheme envisaged intensive anti-erosion measures in the basin followed by large scale wattle planting and the establishment of a wattle extract factory. It appears to have been based very largely on the assumption that land was being cultivated with food crops for export and that such land would be better devoted to industrial purposes designed to provide a higher income per acre and thereby improve the standard of living. The meeting had evidence to show that export crops were not produced in the Mlalo basin and that even by using all the available land (estimated at less than four and a half acres per family) the inhabitants frequently produced insufficient to feed themselves and their livestock. It was scarcely feasible, therefore, to reduce the acreage under cultivation and grazing still further by planting wattle and in the opinion of the meeting the only land available for the purpose was steep badly eroded land which occurs in patches throughout the basin. Further survey, it was decided, was required to ascertain the extent of such eroded land and whether, if soil and vegetation could be regenerated, it would not be desirable to utilize some of it for perennial fodder crops. It was concluded that greater scope for wattle planting lay outside the Mlalo basin either in Forest Reserve or other unoccupied land but the exact extent and whereabouts of such land required further investigation.

Dr. Nutman's scheme naturally focused attention on the seriousness of the problem confronting the Mlalo basin in particular and the meeting was of the opinion that some definite action should be taken at the earliest possible moment. It was resolved that the first step should be a detailed agricultural survey of the area followed by a large scale demonstration of sound mixed farming which would embody methods of soil, rainfall and fertility conservation, grazing management, stall feeding and regeneration of soil cover on denuded land. A scheme for such a demonstration was propounded in 1942 by officers of the Administration, Agricultural, Forestry and Veterinary Departments but was not implemented owing to lack of staff and the meeting agreed that it formed a suitable basis for present purposes but that substantial increases in the estimated costs would be necessary. The demonstration is intended to cover an area of about 2,000 acres and, to carry it out effectively, strict enforcement of a number of new Native Authority Orders would be necessary, particularly in regard to the demarcation of grazing and closed areas.

Although the Mlalo region is the most over-crowded and over-cultivated in the Usambaras, and has, therefore, had most attention focussed upon it, one must not forget that other regions in the West Usambaras, notably the sub-chiefdoms of Mtae, Lushoto, Vuga and Bumbuli will be faced with exactly the same problems in the not very distant future. In the Pare mountains the situation has not been studied in any detail but merits close investigation as soon as staff becomes available for the purpose. Whether the peoples of these other threatened areas will awake to their predicament and consolidate their position before force of circumstances drives many of them away from their salubrious climate, as has happened at Mlalo, remains to be seen. To this end, perhaps, the proposed demonstration in the Mlalo basin will be instrumental in arousing interest over a wider field than that for which we hope.

In the Usambaras there were 166 convictions for offences against anti-erosion orders in 1945.

Pests and Diseases

Locusts.—After the severe hopper invasion in the Pares and Usambaras during April and May 1944 only a minor campaign, which was dealt with by beating under the supervision of African Instructors, developed in the Mkomasi area at the end of 1944 and early 1945. In March and April of 1945 although a few reports of flying swarms were received there was no egg-laying of any consequence in the Province. In November-December 1945 numerous reports of egg-laying in the Pares and Usambaras were received and by the end of the year a full scale poisoning campaign was in progress in these areas. Mr. Notley, Entomologist, launched this campaign but was soon summoned to further outbreaks in the Northern Province. From then onwards Mr. Costelos, Assistant District Officer, Korogwe, and Major Steptoe, Civil Dispersal Officer, conducted campaigns in the Mkomasi gap and the Luengera valley respectively, while several officers from other Departments were called in to assist.

Other Pests.—Elegant grass hopper took its usual toll of young cassava, particularly in Handeni where it is a major pest every year between the short and long rains. Tuber moth and Root mealy bug (*Pseudococcus bromelia*) caused a good deal of damage to stored potatoes at Lushoto. Cauliflower

aphis was particularly severe on Brassicas in the Usambaras, presumably owing to the very dry weather prevailing. Cotton leaf roller was severe in Handeni and American and Spiny bollworm also caused damage.

Diseases.—Ring rot (*corynebacterium sepidonicum*) was recorded in potatoes on a farm near Lushoto early in the year but does not appear to have spread to any great extent so far. Brown rot (*Xanthomonas solanacearum*) was severe in the 1945 short rains crop at Lushoto. Irish blight of potatoes (*Phytophthora infestans*) was not severe in 1945; the disease was also recorded on tomatoes. About a dozen new host plants of various plant diseases were observed by the Scientific Assistant to the Plant Pathologist.

Vermin.—Elephant, pig, baboons and rats were outstanding among the various reports of vermin damage during the year and the assistance of the Game Department had to be invoked on several occasions to counteract the depredations of the first-named. About fifty Native Authority vermin poisoners have been employed in the Province over the past three years and reports about their efficiency in reducing the vermin population are somewhat vague and conflicting. The eight poisoners employed in Handeni are stated to have killed 3,906 baboons, 369 monkeys and 29 pig but it is feared the figures must be viewed with a good deal of reserve, and in many case the slaughter of 29 pig, whose nocturnal feeding habit makes them the worst enemy of cassava, is very unsatisfactory. This Department advocates communal block planting of cassava as the most economical method of protection against both pig and baboon.

Marketing

In the Pares all surplus native produce was sold at Native Authority markets, and in other districts at declared buying posts supervised by officers of the Provincial Administration or Agricultural Department. Prices at the various buying places were fixed from time to time by the District Commissioner concerned and the number of buyers was limited according to the amount of produce on offer.

Exceptions to the above were cotton, coffee and oranges which were purchased direct from the growers by the Moshi ginning firm, Kilimanjaro Native Co-operative Union and the Government Agents (Messrs. Dalgety and Co.) respectively.

The following were the approximate prices paid in cents per kilogram to growers at produce markets, buying posts and native barter markets within twenty miles of railhead :—

	Controlled Markets	Native Markets (Uncontrolled)
Seed cotton A	Cts 31½ ... Cts 07½	—
Seed cotton (Handeni)	Cts 30 ... Cts 06	—
Coffee (parchment)	Sh. 1/20 ... —	—
Copra, Grade I	Shs. 5/15 per frasila at mill	—
II	Shs. 4/90 per frasila at mill	—
III	Shs. 4/65 per frasila at mill	—
IV	Shs. 4/40 per frasila at mill	—
Paddy	Cts 17	Cts 20
Maize	Cts 10 to Cts 12	Cts 20 to Cts 30
Beans	Cts 11 to Cts 13	Cts 30 to Cts 50
Potatoes	— —	Cts 35
Cassava	Cts 08 to Cts 11	Cts 15 to Cts 25
Vegetables	Cts 15 to Cts 25	—
Onions	Cts 40 to Cts 50	—
Oranges	Cts 03½ —	—

Miscellaneous

Seed.—The following amounts of seed were distributed to natives (for cash) during the year :—

Potatoes	53 bags
Wheat	30 ,,
Sorghum (Dobbs)	25 ,,
Maize (Katumbili)	10 ,,
Onion	180 lb.
European vegetables	184 ,,
Groundnuts	80 bags

Seed Farms.—The Usambara Native Treasury decided to withdraw all financial assistance towards the Lushoto Native Authority farm at the end of 1945. This will now be used by the Department for trials of potatoes, fodder and pasture grasses and for initial multiplication of any new varieties of crops imported. One and a half tons of potatoes were raised on the farm in 1945, a large proportion of which were unfortunately lost during storage through an attack of tuber moth.

Communications.—Major improvements have been carried out to the Tanga-Moshi road by the Public Works Department working in conjunction with the military. Between Mombo and Mnyusi, a distance of 45 miles, all the bad stretches have been drained, surfaced with murram and properly bridged so that this section is now practically all-weather, including the notorious Luengera valley. A large amount of draining and surfacing has ngulu road has been widened in places but apart from this the minor roads both of which are important produce evacuation routes. The Korogwe-Ambangulu road has been widened in places but apart from this the minor roads of the Province have received little more attention than the usual cleaning.

The Railway lorry services on the Korogwe-Morogoro and Mombo-Lushoto routes have proved invaluable in these days of commercial transport shortage.

Meetings.—The Korogwe District Production Committee held four full meetings during 1945 and was dissolved at the end of the year. The Senior Agricultural Officer attended one meeting of the Post-War Land Settlement Sub-Committee, the District Commissioners' Conference and a meeting of Administrative and Departmental Officers convened to discuss land usage in the Usambaras.

Visitors.—The Lushoto office was visited on two occasions by His Excellency the Governor.

R. D. Linton,
Senior Agricultural Officer,
Tanga Province

Lushoto,
27th February 1946

OFFICIAL DISTRICT TOURING *Annexure*

	Nights Absent	Days in Field	Total
Senior Agricultural Officer (9½ months)	49 ...	47 ...	96
Agricultural Officer, Tanga	128 ...	52 ...	180
Crop Supervisor, Tanga (4½ months)	61 ...	2 ...	63
Cotton Supervisor, Same	237 ...	— ...	237

Miles Travelled

	Own Car	Hired Transport	Total
Senior Agricultural Officer	3,189 ...	260 ...	3,449
Agricultural Officer, Tanga	5,854 ...	— ...	5,854
Crop Supervisor, Tanga	— ...	330 ...	330
Cotton Supervisor, Same	3,988 ...	— ...	3,988
Total ...	13,031 ...	590 ...	13,621

ANNUAL REVIEW OF THE WESTERN PROVINCE, 1945

Staff

On the 18th April 1945, Mr. A. Pitcairn, Senior Agricultural Officer, assumed charge of the Western Province. Mr. Pitcairn took over from Mr. T. C. Cairns, Agricultural Officer, who proceeded on annual leave pending transfer to Arusha.

The District European staff consisted of: Mr. V. Allen, Agricultural Assistant, Nzega, stationed at the Mwanhala Agricultural Station; Mr. R. Seager, Agricultural Assistant, Kasulu, in charge of the Haricot Bean Scheme; Mr. H. J. P. Nelson, Field Assistant, seconded from the Tsetse Department. Mr. Nelson was occupied touring in Kahama District; Mr. P. Couvarakis, Temporary Crop Supervisor, Kigoma. Mr. Couvarakis resigned as from 28th February 1945.

The Senior Agricultural Officer visited all Administrative Districts of the Province during the year; Mr. Allen toured the Nzega District; Mr. Seager and Mr. Nelson were absent on annual leave during January and February, and October and November respectively.

The distribution of the African staff throughout the Province during the year was as follows:—

District	Instructors Ungraded	Instructors War Production	Beewax Instructors War Production	African Overseers
Tabora	5	20	1	2
Kahama	3	6	1	—
Nzega	5	8	—	2
Kigoma	2	10	—	—
Kasulu	3	15	—	—
Kibondo	2	10	—	—
Ufipa	1	6	—	—
	21	75	2	4

There is a vacancy for a graded Instructor but no suitable candidate was selected for the post. One ungraded Instructor was transferred to the Eastern Province and one temporary Instructor was transferred from Kondoa-Irangi to Tabora. Two Instructors died during the year, one Lugobi after twenty-one years' service with the Department. The Provincial Agricultural Officer was staffed with one African Clerk, Grade III, Mr. James C. Mhango, and one messenger. Mr. Mhango was on leave for three months and his duties were carried out by an ungraded clerk transferred from Kilosa.

The European staff for the Province is inadequate to carry out the post-war reconstruction work envisaged or to give adequate supervision to the African staff and the Provincial Agricultural Office building is unsuitable as an office, but steps are being taken to provide the requirements of the Province as development progress and needs arise.

General Review of the Year

Production generally, although an improvement on the previous year, was not up to expectations. There was a considerable variation in yields in different parts of the Province owing to the uneven distribution of the rains and the exceptional late heavy rains in April and May, which, although beneficial to root crops, were harmful to manuring grains. Yields of foodstuffs, however, were quite good and averted any famine conditions requiring relief measures. In fact the increased production of cassava and good yields of maize provided reserves sufficient to allow considerable supplies of cassava and maize to be released for export from the Province. Rains were late in starting for the 1945/46 season, but the favourable and continuous rains in December permitted opportunity for the planting of all crops and the prospects at the close of the year for the coming season are good.

The following tables show the rainfall each month in inches at representative parts of the Province compared with the monthly average :—

	Tabora		Kahama		Kigoma	
	1945	Average	1945	Average	1945	Average
January ...	7.34	4.89	3.83	4.72	9.41	4.27
February ...	4.96	5.10	2.73	4.84	8.67	4.82
March	3.68	6.90	4.26	7.35	4.13	7.86
April	5.88	5.12	6.41	5.76	4.62	5.20
May	4.81	1.06	5.59	1.54	4.44	1.63
June	0.00	0.09	0.00	0.17	0.55	0.32
July	0.00	0.00	0.09	0.08	0.00	0.17
August	0.01	0.04	0.00	0.08	0.00	0.11
September ...	0.03	0.32	0.00	0.42	0.20	0.97
October	0.40	0.58	0.12	1.57	2.22	1.56
November ...	1.31	4.26	5.00	4.79	9.84	5.12
December ...	11.18	6.58	5.82	5.37	3.90	6.49
Total ...	39.60	34.94	33.85	36.69	47.98	38.52

Up to the end of the year there has been little change in the agricultural conditions since the end of the war, but it is anticipated that, with a greater supply of trade goods in the near future and a more favourable season, an increase in production may be expected. The shortage of hoes caused some anxiety as supplies were far short of the demand. This demand for hoes and a keener interest by the cultivators to secure further supplies of groundnut and rice seed is a good indication that renewed interest is being taken in production since the drain on man power for the army and sisal labour has eased.

Notes on the Chief Crops

Grains

Sorghums and Millets.—Production varied from poor to good and although there were adequate supplies for local use and seed there was little surplus to spare. Only 68 tons of sorghums and 56 tons millets were sold at the produce markets as compared with a total of 1,650 tons of sorghums and millets last year. The Kahama crop was poor and considerable damage was done to the Nzega crop by birds. Over 700 tons of sorghums and 300 tons of millets were exported from the Province early in the year. These quantities were a carry-over from surplus stocks of the previous year.

Eleusine.—This is the staple grain crop grown in Ufipa. Small quantities are exported annually to Northern Rhodesia.

Maize.—The quantity of maize sold at the produce markets was 1,303 tons compared with 1,830 tons in 1944 and 1,038 tons in 1943. The quantities marketed in each district during the last three years were :—

	1945 Tons	1944 Tons	1943 Tons
Tabora ...	487·7	572	168
Kigoma ...	652·5	952	599
Nzega ...	88·7	216	211
Kahama ...	74·1	90	80
	1,303	1,830	1,058

Over 800 tons were exported from the Province.

Rice.—One thousand five hundred and twenty-four tons of paddy were sold at the produce markets with 1,279 tons the previous year and 2,331 tons in 1933. The quantities marketed in each district are as follows :—

	1945 Tons	1944 Tons	1943 Tons
*Kigoma ...	916	1,025	1,269
Nzega ...	502	232	745
Tabora ...	22	4	67
Kahama ...	84	18	250
	1,524	1,279	2,331

*Does not include the Ufipa crop.

Of the 916 tons of paddy marketed at the produce markets in Kigoma District, 420 tons were marketed at Ujiji produce market and 496 tons at the Kigoma Lake ports as follows : 240 tons at Lagossa, 176 tons at Karema and 80 tons at Kalya. 243 tons of paddy was shipped to Kigoma from the Ufipa lake ports. Four rice mills were operating at Ujiji, one at Kigoma and one at Bukene. No rice was milled at the Tabora mills. The Tanganyika lake shore area crop was below average and the Tabora and Kahama crop poor. In the Nzega District paddy was the most successful crop of the year. The quantity of paddy milled at the rice mills was 1,858 tons and 1,114 tons of rice were produced.

Root Crops

Cassava.—Special efforts were made to increase reserves of cassava and more acreage was planted than at any time during recent years. Early planting of this crop leads to more rapid maturity and better results. An area of "Liongo" variety is cultivated at the Agricultural Stations for distribution. This variety is in demand in areas where damage is done by wild pig owing to its unpalatability to vermin. Two thousand tons of cassava came on to the produce markets as compared with 337 tons in 1944 and 940 tons in 1933. Over 1,200 tons were exported from the Province during the year.

Sweet Potatoes.—This crop augments local food supplies, and production this year was very good owing to the heavy and late rains. Planting was carried out on a large scale, and people need little urging to plant the crop. In the Kasulu Highlands sweet potatoes take the place held by cassava in the other areas of the Province as the famine reserve food supply.

Legumes

Beans (Mixed).—The quantity of mixed beans marketed in 1945 was about the same as last year, namely 262 tons as compared with 269 in 1944. Most of the mixed beans marketed in 1945 came from the Kahama and Nzega produce markets. No mixed beans were available for purchase at the Kigoma District markets, which markets in the past were an important source of mixed beans. The mixed beans grown in the Kasulu District pass through the local markets for sale in small quantities amongst the local people, who in turn purchase other commodities.

Small quantities of gram and cowpeas were produced to meet local demand. The quantities sold at the produce markets were :— Gram (Choroko) 11 tons and Cowpeas (Kunde) 36 tons.

Oil Seeds

Groundnuts.—The groundnut crop, although not up to expectation, was much higher than last year. It is estimated that over 500 tons of the crop were manufactured into groundnut oil in the Province. The 1945 market returns showed a turn-over of 1,187 tons as compared with 720 tons in 1944, and 1,638 tons in 1943. The quantities marketed in the various districts were as follows :—

	1945 Tons	1944 Tons	1943 Tons
Tabora ...	632	306	1,225
Nzega ...	355	330	83
Kahama ...	173	70	294
Kigoma ...	27	14	36
Total ...	1,187	720	1,638

Considerable quantities of groundnuts have been released for seed additional to the normal quantities reserved by the growers and an increase in acreage in 1946 is anticipated.

Other oil seed crops are Bambarra groundnuts and sesame, but they are of minor importance in trade and only 14 tons of Bambarra and 8 tons of sesame were sold at the produce markets.

Onions, Vegetables and Fruits

Onions.—During the year 480 lb. of onion seed were distributed. The bulk of this seed was taken up by onion growers in Nzega District, fair quantities went to Tabora District and small quantities to all other districts. There is a ready sale for all the onions produced, and the demand for more seed continues.

Vegetables.—One hundred and eighteen lb. of vegetable seeds of various kinds have been received and all the seeds have been taken up readily. There has been a demand from all areas of the Province and in many areas the natives are showing a definite liking for the commoner types of vegetables, such as cabbage, cauliflower, turnips, carrots, beetroot and tomatoes. The demand for vegetable seeds by natives is likely to increase now the introduction of this food into the native diet is becoming established.

Fruits.—Citrus fruits and avocado pears are successfully grown in the Province and there is a steady demand for planting material of various kinds of fruit trees. Every effort was made to secure supplies to meet the demand.

Other Important Products

Beeswax and Honey.—Climatic conditions were unfavourable and production of beeswax and honey fell considerably. The tonnage moved by rail in 1945 was 126 tons beeswax and 113 tons honey as compared with 295 tons beeswax and 128 tons honey the previous year. Part of the honey moved by rail in 1945 was 1944 production.

No progress has been made in improving honey production during the year, as during the war all honey could be sold, but now the market for East African honey for export may cease unless the quality is improved. In the absence of a better price for unboiled honey there is little hope of improving the quality, but with the assistance of legislation and the provision of Instructors and honey Graders plus a better price for grade honey it should be possible to find a market. Consideration is being given to the development of the industry on these lines owing to the economic importance of this product in Sleeping Sickness Settlements and isolated forests communities.

Gum (Arabic).—The Nzega gum markets were opened in July and closed in November. The total sales at the markets were 394 tons as compared with 568 tons the previous year. Large quantities of Nzega gum are sold in the Lake Province. The Agricultural Assistant, Mwanhala, Nzega, visited the markets to give some supervision to the control of the markets and grading of the gum. African Instructors gave assistance to the Native Authority Gum Market Clerks and Graders. Gum is now appearing on the produce markets in Kahama District and enquiries were made about marketing gum from Nyonga, Tabora District.

Other Miscellaneous Products

Wheat.—Wheat is produced in small quantities by natives in Ufipa and Uha. The Mission at Chala, Ufipa, operates a flour mill where the wheat grown at Chala and other Missions is milled.

Potatoes (European).—The demand for the small quantities of potatoes grown in Ufipa was far in excess of the supply this year. This demand mainly came from the Mpanda Mine area and also owing to short supplies elsewhere in the Territory during July and August.

Coffee.—The production of coffee by the few settlers in Ufipa is mostly abandoned and only small quantities are produced for local use.

Agricultural Pests and Diseases

The Red Locust.—A careful watch has been kept on escaping swarms of Red Locusts from the Rukwa and precautionary measures were taken to deal with egg-laying areas where necessary. A reserve of locust material was kept at Tabora. Movements of flying swarms were reported from time to time in south-western Tabora and Kigoma districts. No damage was reported.

The Desert Locust.—At least two small swarms of the Desert Locust invaded Nzega and Kahama District from the east and passed out of the Province to the north. No damage or egg-laying was reported.

Bean Pests and Diseases.—The haricot bean crop at Kasulu suffered severely from various bean pests and diseases. There was a heavy infestation of bean rust on the introduced "Cambridge Countess" haricot bean variety. Leaf eating beetles caused severe damage to the bean crop all over Uha and

the bean fly did considerable damage to the crop at Makere. Other bean diseases were angular leaf spot and white mould.

Stalk-borer.—A heavy infestation of maize stalk-borer was experienced in Nzega District.

Birds.—Birds did serious damage to grain crops in eastern Nzega Chiefdoms.

Cassava Pests.—Cassava scale was severe in a number of areas in Tabora District and the elegant grasshopper has been particularly troublesome this year.

Mylabris Beetles.—Collection of this beetle for export for medicinal purposes was carried out again this year and a total of 891 lb. was collected as compared with 360 lb. last year. Most of the beetles were collected and purchased at Mwanhala, Nzega District.

Agricultural Stations

The two Agricultural Stations, namely the Tumbi Agricultural Development Centre and the Mwanhala Agricultural Development Centre, were maintained during the year. Both stations are financed by funds from the Native Authorities, by a grant from the Department and by revenue from sales of produce.

The financial position at each station was as follows:—

	Mwanhala			Tumbi	
	Shs.	Cts.		Shs.	Cts.
Balance brought forward from 1944	820	00	...	1,270	73
Native Authority Contribution	5,000	00	...	1,300	00
Department of Agriculture Contribution	2,500	00	...	2,500	00
Revenue 1945	2,036	24	...	1,876	15
	10,356	24	...	6,946	88
Expenditure 1945	8,379	77	...	5,034	74
Balance carried forward 1st January 1946	1,976	47	...	1,912	14

Most of the old series of experiments were concluded this year and, apart from a fallow, a manurial and a ridging experiment at Mwanhala, and fallow experiment at Tumbi, no other new experiments are being laid down or decisions made until the results of the previous experiments are worked out. Both farms continued their full programme of work as centres for agricultural instruction and supplying good seed.

The following are extracts from the report of Mr. V. Allen, Agricultural Assistant in charge of the Mwanhala Station:—

Mwanhala Agricultural Development Centre

In general, the weather was excellent as the rains broke in September 1944 and went on until the end of May, a total for the season of 46·48 inches being recorded. There was, unfortunately as it appeared at the time, a long hot, dry spell in December, and this delayed planting for a time. However, it was, ultimately, of no detriment, as the rains again broke early in January and no other set-backs occurred. Voluntary labour, at all times, was very scarce and threatened delay in the work of planting. Owing to the infiltration of tsetse during 1944 bush clearing was continued into February, and a useful area of regeneration was cleared. This helped, for the time, to keep the fly

from encroaching up to the farm lines, but, later in the year, the fly came in from other directions, and very serious losses of stock were caused, and the whole question of clearing on a much greater scale has had to be taken up.

Crops.—With the increase of the area under paddy, further acreage of cassava, and the new series of experiments, and systematic interplanting, together with the growing crops of pigeon pea and cassava, an equivalent of approximately 161 acres was under crop by the end of April. The quantities of produce harvested were as under :—

	1945 Harvest lb. Approx.	1944 for comparison
Maize	10,509 (clean grain) ...	8,823 (husks)
Millets	1,185	4,289
Groundnuts	8,208 (in shell) ...	7,046
Cow-pea	1,514	429 (husks)
Chick-pea	741	—
Pigeon-pea	1,855	458
Cassava	7,577	1,100
Gram	173	225
Various Beans	413	159
Paddy	22,790	6,442
Tepary Beans	777	351
Bambarra Groundnuts	951 (in shell) ...	221 (in shell)
Dried cow-pea leaves (used as a vegetable)	251	—

Seed of all kinds was issued on payment to an increasing number of natives. In addition, quantities of planting material, such as cassava cuttings and banana suckers, were sold. The citrus, bananas, and other fruits also yielded an appreciable cash return. The estimated revenue from the sale of produce of Shs. 1,600/- (increased by Shs. 600/- over the estimate of the previous year) was exceeded by Shs. 858/83, giving a total revenue of Shs. 2,036/24.

Buildings.—A new, large, produce and seed store and a spacious cattle shed were built, and necessary repairs to many other buildings were made, to maintain these existing buildings in some order until new buildings can be erected. A start was made on the building of a new house for the Agricultural Assistant, but owing to the lateness in the year when funds were made available, and impossibility of obtaining all materials, only the stone foundations were got in by the beginning of the rains.

Livestock.—Three sows and a boar were obtained in July to replace the losses of breeding pigs through fly in 1944, but it is regretted that the re-infiltration of fly again caused deaths. Fortunately, one sow farrowed in November and produced a litter of seven, all of which are thriving. As mentioned above, excessive deaths in the cattle herd were caused by fly and this seriously depleted the number of work oxen, and steps had to be taken to procure more oxen for training to ensure cultivation for the new season.

Tools and Plant.—By the timely assistance of the Department, funds were made available for the purchase of an ox-cart, wheelbarrows and hand-tools, which were urgently needed. A new platform weighing machine also was purchased from funds allocated by the Native Authority for the purpose.

Experiments.—Five of the original series of maize experiments (Residual) were sown, harvested and recorded, and these are now discontinued. Following the advice and suggestions given by Messrs. Rounce and Peat after their visit

in December 1944, three larger experiments of a new series were laid down, covering an area approximating 12 acres. These comprise :—

Experiment M.1.—Resting fallows.

,, M.2.—Manurial. (Farmyard compost V Rock Phosphate) planted to maize.

,, M.3.—Cultivation. (Flat and three sizes of ridges, with tie-ridging).

Planted to Dobb's sorghum. The control plots of M.1 and the complete M.2 and M.3 were duly harvested and recorded.

Opportunity was found in December to plant up M.1 and M.3 and by the end of the month both were coming away very evenly.

Tumbi Agricultural Development Centre

Overseer Ramadhani Masegese Kukila was in charge of the Tumbi Station during the year. The station was frequently visited by the Senior Agricultural Officer and the Agricultural Officer. All the old series of experiments were completed and the results of the harvest recorded. One new experiment was started, a fallow experiment.

Similar conditions prevail at Tumbi as at Mwanhala in regard to tsetse bush encroachment and to prevent losses of livestock all the draught oxen were sold and only a small working herd retained. A large area of bush was cleared in September and the assistance rendered by the District Commissioner, Tabora, in getting this work done expeditiously was greatly appreciated. The station was equipped with several new tools and implements. The ears under crops during the year was 37·6 acres approximately. The following seed was sold to natives for planting 1,821 kilos maize, 540 kilos groundnuts, 741 kilos Afaa rice, 853 kilos Sena rice, 992 kilos Moshi rice and 116 kilos Pishori rice, 721 kilos Bambarra groundnuts, 114 kilos bulrush millet and 85 kilos gram. A sum of Shs. 1,077/50 was realized from the sale of the above seeds. Shs. 637/- was realized from the sale of draught oxen and this sum kept in reserve for purchase of new oxen. Shs. 171/50 was realized from hire of ploughs. No new buildings were put up during the year but the existing buildings were kept in repair.

Other Experiments and Crop Trials

Bean observation plots, Kasulu District.—The "Cambridge Countess" variety of haricot bean is being tested with other varieties of white haricot beans in variety trials. Five separate observation plots to try out five varieties have been laid out at Manyovu, Heru Juu, Kasulu, Buhoro Buganda and Makere.

Cotton plot, Kahama District.—The small cotton observation plot at Zongomera, Kahama, run by the Lubaga Experiment Station, Shinyanga District, for observing cotton pests will continue in 1946. The yield in 1945 was very good; over 1,000 lb. per acre were harvested and the expected heavy insect attack did not develop.

Development

The Haricot Bean Scheme.—The results from this scheme are still far from satisfactory. It was hoped that the 1944/45 main crop season would have shown some improvement, but little more than one-third of the seed issued

was returned and in the Makere area the crop was a complete loss. The causes are attributed to too much rain, insect pests, and bean rusts and other diseases. The "Njera" or end of rains planting which are on a very much smaller scale and are limited to Makere, Manyovu and Buhinga only gave appreciable returns at Makere. The "Manyika" or swamp land crop was a good one. For the main crop 1945/46, 364 bags of seed have been issued; this is slightly less than last year's main planting but more than that of 1943/44. Seventeen and a half tons of beans unfit for re-issue as seed were sold at Kigoma.

The following table shows the total quantities of seed issued for planting, the quantities of seed returned by growers, and seed purchased from growers in each of the three plantings.

Crops	Issued for planting	Seeds returned	Purchased from growers
	Kilos.	Kilos.	Kilos.
Main crop, 1944/45	47,862	28,762	3,136
Late planting	10,361	6,616	15,883
Swamp land planting	17,574	11,442	12,725
Main crop, 1945/46	36,497	—	—

The object of the scheme is the permanent incorporation of white haricot beans in Uha Agriculture as a cash and export crop. There are signs that this is gradually taking place, but at present the haricot is not able to compete with the local mixed beans on the market. In this connection the Agricultural Assistant, Kasulu, reports as follows: "The crops of haricot beans were not entirely satisfactory but by no means failed except Makere main crop. The price was so out of proportion to what they could get for their own mixed beans they were disinclined to sell the haricot, preferring to eat their surplus and sell their mixed beans."

Ufipa District.—No special agricultural development is taking place in Ufipa District but the mining activities at Mpanda and the Namwele Coalfields are likely to create an important market for the agricultural products of Ufipa should any large scale mining development take place. At present Mpanda forms a good market for maize and other grain from Ufipa. The various commodities exported in tons from the Ufipa Lake Ports to Kigoma during the last five years are :—

	1941	1942	1943	1944	1945
Paddy	527.0	*	354.2	310.6	243.6
Other grains	27.0	*	11.8	24.1	25.7
Wheat and flour	—	*	4.2	9.2	24.6
Ghee and Butter ...	11.5	*	12.3	16.7	19.4
Groundnuts	—	*	4.4	4.6	8.5
Potatoes (European) ..	—	*	3.1	0.4	3.5
Dried Fish	231.7	*	270.1	263.9	249.3
Beeswax	14.3	*	16.4	11.0	10.7
Hides and Skins	74.6	*	59.4	48.4	54.8
Cassava	—	*	8.9	1.2	0.05
Onions	—	*	4.9	7.4	10.7
Honey	—	*	2.8	2.7	1.6
Timber	—	*	—	17.9	13.4
Coal	—	*	—	7.9	126.3
Miscellaneous	9.0	*	7.5	11.2	20.7

*No records available.

Agricultural Implements.—More interest is being taken in the purchase of ploughs and agricultural implements since supplies are again on the market. A number of ploughs have been supplied to native cultivators. The plough most in demand is a small plough for four oxen and a ridging plough.

Marketing

The number of produce markets in operation in the various Districts of the Province are as follows :—

Districts	Number of markets
Tabora	28
Nzega	14
Kahama	16
Kigoma	2

Produce is also sold at authorized trading centres; it is not possible, therefore, to get the total figures of the quantities of produce marketed in the Province. The returns from the produce markets however act as a guide as to the quantities of different commodities sold in different areas. The total quantities of the various products which passed through the markets in each of the above districts are :—

Product	Tabora Tons.	Nzega Tons.	Kahama Tons.	Kigoma Tons.
Groundnuts	632.4	354.9	172.8	26.7
Paddy	22.3	502.7	84.0	915.7
Maize	487.7	88.8	74.1	652.5
Cassava	216.1	51.9	—	1,732.1
Beans (Mixed)	21.1	97.7	132.3	1.1
Sorghum	42.9	—	26.8	—
Millet	2.0	38.0	16.8	—
Bambarra (Njugu)	9.0	—	—	—
Gram (Choroko)	10.9	—	—	—
Peas (Kunde)	36.5	—	—	—
Sesame	8.3	—	—	—

The total quantity of each product marketed at the produce markets in 1945 compared with that of 1944 and 1943 is as follows :—

Total Sales at Produce Markets

	1945 Tons.	1944 Tons.	1943 Tons.
Bambarra groundnuts	9	2	—
Beans (Mixed)	262	269	420
Cassava	2,000	337	940
Gram (Choroko)	11	31	—
Groundnuts	1,187	720	2,100
Maize	1,303	1,830	1,200
Millet	56	1,366	—
Peas (Kunde)	36	47	—
Paddy	1,524	1,280	3,450
Sesame	8	1	3
Sorghum	68	284	430

The tonnage of the principal agricultural products moved by rail during the year as compared with the five years' average is shown in the following table :—

Tonnage of Principal Agricultural Products moved by rail, Western Province, in metric tons

Product	Kigoma Stations	Tabora and Kahama Stations	Provincial Total	5 years' Average
Groundnuts	1	663	664	2,427
Rice	825	441	1,266	2,382
Paddy	41.5	3.5	45	322
Beeswax	31	95.5	126.5	262
Cassava and Cassava flour	1,072	2,790	3,862	1,787
Maize and Maize Meal	304	1,033	1,337	1,126
Sorghum and Millet	34	1,247	1,281	1,170
Pulses	21	249	270	506
Sesame	3.5	3	6.5	27
Gum	—	459	459	299
Sisal	—	913	913	619
Honey	1	112	113	310
	2,334	8,009	10,343	11,237

Estate Agriculture

The sisal estate at Malongwe, Tabora District, continued to produce fair quantities of sisal. There are also sisal estates at Kazuramimba and other places near Kigoma. The quantities moved by rail in the Province during the year was 913 tons as compared with 715 tons in 1944. An estate at Kigoma is exploiting the possibilities of papain production and several properties near Kigoma and Tabora are interested in the production of fruits and vegetables on a commercial scale. In Ufipa no new land has been taken up by settlers and the four existing estates confine their activities to animal husbandry, fruits and vegetables, growing and trying out any product which is likely to prove a success.

Soil and Water Conservation

As in the past few years, there is not much to report in regard to erosion control in the Western Province during 1945. The need for action is recognised and the steps which could be taken without much expense are fairly well understood but little action is taken. An attempt has been made this year to create more active interest in this problem. Propaganda through the Administrative and Agricultural staff has been carried out constantly to get landholders who cultivate land on the slope to prepare their ridges on the contour and to adopt, where necessary, the practice of tie-ridging. Some results of these efforts are becoming apparent. The conservation of water in small earth dams for irrigating rice fields continue to prove their worth and Native Authorities in Tabora and Nzega Districts have recognised this by inserting in the 1946 Native Authority estimates an appreciable sum for constructing dams and laying out contour banks in their chiefdoms.

Agricultural Education

Two pupils from the Western Province who completed their course at Ukiriguru were appointed as ungraded instructors; one more is in training in his second year. Five pupils were selected and entered the school in October this year. Government and Native Authority School gardens are frequently visited by the European and African staff. In order to prevent abandonment of school gardens during the school holidays the Government Inspector of Schools and District Commissioners were asked to provide funds for the maintenance of these gardens during the long vacation.

Sleeping Sickness Settlements

Land has been selected at the Usagari Sleeping Sickness Settlement, Tabora District, to carry out trials on a field scale under native conditions with silico-phosphate. The object of the trial is to discover whether the use of this fertilizer is likely to prove economic and as an aid to restoring fertility of exhausted soils. An Agricultural Survey has been carried out at the Runzewe-Msasa Sleeping Sickness Settlement, Kahama District, to report on the area under consideration for resettlement.

Conclusion

Frequent consultations have been held with the Provincial Commissioner and Provincial Economic Control Officer, over matters connected with the

produce control regulations which required local action or reference to the Economic Control Board. Consultations have been held with officers of the Veterinary and Education Departments on matters of inter-departmental interest and the Provincial Administrative staff have rendered all possible assistance. The response of the officers of the Department to deal with the various problems in hand has been willing and energetic.

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ANNUAL REPORT OF THE PLANT PATHOLOGIST, 1945

General

This report covers the period 1st January to 4th November, on which date the Plant Pathologist proceeded to the United Kingdom on vacation leave. On 5-6th March he attended the Conference of Plant Pathologists at Kampala and then proceeded on safari in the Lake and Western Provinces and to Dodoma and Morogoro. That safari was primarily to make a survey of the virus disease of sweet potato, but other crops were examined for disease, and the results were reported in Mycological Circular No. 17.

Short safaris were made to Arusha and Monduli from 12th to 16th January and to Rongai in the Moshi District from 28th February to 2nd March.

Mrs. M. M. Wallace, Temporary Scientific Assistant, was on duty until 3rd November, when her appointment was terminated. She was on safari in the Lushoto District from 27th January to 3rd March.

The Hon. the Director of Agricultural Production, the Deputy Director of Agriculture and the other members of the Senior Agricultural Officers' Conference at Lyamungu visited the laboratory on 11th January.

Publications

Pamphlet No. 38, "Cultivation and Diseases of Wheat," was published in collaboration with Mr. N. R. Fuggles-Couchman, Agricultural Officer.

An article entitled "Tomato Blight" was published in the East African Agricultural Journal, by the Plant Pathologist and Temporary Scientific Assistant.

Five Mycological Circulars, Nos. 15 to 19, were published by the laboratory staff. Nos. 15 and 18 contain the sixth and seventh lists of recent records of plant diseases. No. 16 is a list of publications issued from the laboratory to date. No. 17 is a Report on a Plant Disease Survey in the Lake and Western Provinces and on the Central Railway, March-April 1945. No. 19 is a brief description of onion diseases.

Diseases of Crops

Sweet Potato.—The suspected virus disease referred to in the last Annual Report is now known to occur widely north of and along the Central Railway of the Territory; it doubtless occurs south of the railway but there are no records. None of the varieties examined has been found completely immune. Several indigenous of Ipomoea have virus symptoms which may be the same disease.

The following other diseases of sweet potato have recently been recorded in the Territory: Foot rot (Plenodomus destruens Harter) causing black dead areas on the stems; this seems to be as widely distributed as the virus disease and is also destructive; it is recommended that only healthy vines be used for propagation. Root disease (*Macrophomina phaseoli* (Maubl.) Ashby) and leaf spot (*Cercospora* sp.) have also been observed.

Irish Potato.—Blight (*Phytophthora infestans*) is now widely distributed in the Territory. The Bukoba District was apparently still free in March, and there has been no record of the disease from Songea. Only an insignificant amount of infection was seen at Rongai in the Moshi District in February.

Tubers of the "Arran Chief" were introduced by the Department from South Africa, but were found to be very susceptible to blight. This variety and the more resistant "Sebago" were received in July by favour of the Institut National pour l'Etude Agronomique du Congo Belge. These are being grown in quarantine and are being observed for behaviour under local conditions. A few tubers of one variety have been grown for the Senior Plant Pathologist, Nairobi, and their resistance to blight has been reported upon.

Bacterial wilt or Brown rot (*Xanthomonas solanacearum* (E.F. Sm.) Dowson), first recorded in Kenya in 1944, was diagnosed in one field of potatoes near Lushoto. Infected tubers were destroyed.

Tomato.—No further records of blight (*P. infestans*) in tomato have been received, doubtless through lack of observations. Bacterial wilt (*X. solanacearum*) was found at Lyamungu causing considerable loss in one plot of tomatoes. The parasite is a common cause of wilt diseases elsewhere particularly among Solanaceae.

Banana.—Cigar-end rot (*Stachylidium theobromae Turc.*) was stated in the Annual Report for 1943 to have been found only on one variety of banana, on Kilimanjaro. It has since been recorded on the following Kilimanjaro varieties: "Nshare wa Nshonowa," "Mbwe," "Urarao," "Kinguruwe" and "Ngumadu."

New records of diseases, other than the above, on vegetable crops are:—

Cauliflower.—Dark leaf spot (*Alternaria brassicae* (Berk) Sacc. = *A. Circinans* (B. and C.) Bolle), at Bukoba. Brown rot (*A. brassicae* (Berk.) Bolle = *A. herculea* (E. and M.) Elliot) at Lushoto and Arusha.

Turnip.—Brown rot (*A. brassicae* (Berk.) Bolle) at Lushoto.

Leek.—Leaf spot (*Stemphylium botryosum* Wallr.) at Lushoto.

Spinach beet.—Leaf spot (*Cercospora beticola* Sacc.) at Arusha.

Egg plant.—Leaf spot (*Alternaria solani* (E. and M.) J. and G.) at Lyamungu.

Lettuce.—Leaf spot (*Cercospora longissima* (Cugn.) at Lyamungu.

Onion.—Downy mildew (*Peronospora destructor* (Berk.) Casp.), followed by *Stemphylium botryosum* Wallr. at Mbulu.

New records of diseases on fruit trees are:—

Apple and pear.—Bitter rot (*Glomerella cingulata* (Stonem.) Spauld. and Schrenk. in conidial stage) at Lushoto.

Vine.—Leaf spot (*Cercospora viticola* (Ces.) Sacc.) at Lushoto.

Lemon.—Scab (*Elsinoe fawcetti* Bitanc. and Jenkins, in conidial stage *Sporotrichum citri* Butler) at Morogoro.

Mango.—Leaf spot (*Cercospora mangiferae* Koord.) at Tabora.

Olive.—Leaf spot.—(? *Coniothyrium oleae* Polac.) at Lyamungu.

Diseases of cereals and grasses:—

Wheat.—Stem rust (*Puccinia graminis* Pers.) was again destructive in the Northern Province. The forms identified were as follows:—K1 on Kenya

Governor at Mbulumbul, K2 on the Ardai, and probably K2 on SL3 and Reward at Mbulumbul.

The following are new record of cereal diseases in the Territory :—

Wheat.—Spot blotch (*Helminthosporium sativum Pammel*, King and Bakke) on variety 192 from Ardai.

Oats.—Crown rust (*Puccinia coronata* Corda), and leaf spot (*Helminthosporium avenae* Eidam) at Lushoto.

Barley.—Leaf blotch (*Rhynchosporium secalis* (Oudem.) J. J. Dabis) at Rongai, and Spot blotch (*H. sativum*) at Sanya.

Rye.—Stem rust (*P. graminis* Pers.) at Ngare Nairobi, and Spot blotch (*H. sativum*) in the Northern Province.

Bulrush millet.—Zonate leaf spot (*Gloeocercospora sorghi* Bain and Edgerton) in the Lake Province.

Elephant grass.—Zonate leaf spot (*Gloeocercospora sorghi* Bain and Edgerton) at Lyamungu (collected 1943).

Sorghum.—Leaf blight (*Helminthosporium turcicum* Pass.), and a leaf spot closely resembling *Titaeospora andropogonis* (Miura) Tai in the Lake Province.

Eleusine.—Leaf spot (*Phyllachora eleusines* Speg.) at Moshi and Ngara : Leaf blight (*Helminthosporium ?nodulosum* B and C.) and Leaf spot (*Cercospora fusimaculans* Atk.) at Ngara.

Panicum sp.—Ergot (*Claviceps* sp.) at Tabora.

New records of diseases of pulse crops and ginger are :—

Soy bean.—Leaf spot (*Ascochyta* sp. possibly *A. phaseolorum* Sacc.) at Bukoba and Biharamulo. Root disease (*Rhizoctonia bataticola* (Taub.) Butler) at Ukiriguru.

Cowpea.—?*Bacterium vignae* Gard. and Kendr. at Ukiriguru.

Bambarra groundnut.—Leaf spot (*Cercospora canescens* Ell. and Mart.) at Bukoba.

Ginger.—Anthracnose (*Colletotrichum ?Zingiberis* Sundarar.) Butler and Bisby) in Bukoba District.

New records of diseases of ornamentals :—

Asclepias curassavica.—Mildew (*Oidiopsis taurica* (Ley.) Salm.) at Lyamungu.

Poincettia.—Rust (*Melampsora* sp. in Uredo stage only) at Lyamungu.

Cassia sp.—*Diatrypella* sp. on dead twigs, Pink disease (*Corticium salmonicolor* Berk. and Br.) and leaf spot (*Cercospora cassiae* P. Henn.) at Lyamungu.

Bougainvillea.—Leaf spot (*Colletotrichum* sp.) at Morogoro.

Zinnia elegans.—Leaf spot (*Cercospora atricincta* Heald and Wolf) generally distributed.

New records of diseases of indigenous plants :—

Datura stramonium.—Leaf spot (*Alternaria solani* group) at Lushoto.

Melanthera brownei.—Rust (*Uromyces melantherae* Tke.) at Lyamungu.

Bidens pilosa.—Rust (*Uromyces bidentis* Lagh.) at Arusha.

Lippia ukambensis.—Rust (*Puccinia lippiivora* Syd.) at Lyamungu.

Rubia cordifolia.—Rust (*P. dimorpha* Syd.) at Lyamungu.

Ipomoea spp.—Rust (*Coleosporium ipomoeae* (Schw.) Burr.) and White blister (*Cystipus ipomoeae-pes-caprae* Ciferri).

Euphorbia spp.—Rust (*Melampsora* sp. Uredo stage) at Lyamungu.

Ageratum conyzoides.—Leaf spot (?*Rangnhildiana agerati* Stevens) (Stev. and Solh.) at Lyamungu.

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